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Postgraduate Medical Education*

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In a discussion of postgraduate education before the Congress on Medical Education in Chicago two years ago, a well-known educator stated that undoubtedly postgraduate education was the most important item before the medical profession. While many individuals whose opinions are entitled to respect have acclaimed postgraduate education as "most important," I shall be content if there is agreement that it is important enough to be included among the other phases of medical education, and indispensable to the functioning of an adequate medical service. If this be accepted, postgraduate teaching will eventually find its place in the educational program.

Postgraduate education in medicine has been discussed widely during the past two decades. There are probably several reasons for this. Among these are the rapid, almost revolutionary advances and changes in techniques and the adjustments in practice required by the discoveries in the fundamental sciences. Another reason, and I think this of more than passing importance, is the emphasis put on adult education in general. In some sections of the country, the adult education movement has greatly stimulated continuation studies in medicine. These are the areas where universities have developed strong extension activities. In many communities the medical profession itself has fostered programs of postgraduate training in accordance with its needs for continuing educational opportunities. Still another factor has been the stimulus and support of Federal and State public health agencies and many philanthropies. A final reason has been the increasing recognition of the importance of health on a community, state and national basis with the collaboration and support of all agencies interested in social progress.

"In the past there has been a tendency to regard postgraduate medical education as something detached and apart. From an educational point of view the different phases in the training of a physician should be regarded as a coordinated entity. Every step in the sequence of a medical education—premedical studies, the medical school, the years in the hospital as an intern, and later as a resident or fellow, on through the period of general practice and postgraduate training,

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leading in some instances to specialism—should have as its objective one underlying and dominant aim, namely, the proper and continued training of physicians qualified to cope successfully with the medical needs of the country.”¹

Touching briefly on medical education as a whole, although the requirements for medical school entrance are still undergoing discussion and may be susceptible to improvement, in the main they offer a satisfactory background for a beginning in the medical school. Notwithstanding the many criticisms of the undergraduate program, this, too, is on a reasonably sound basis. The service rendered by the American Medical Association about the turn of the century through the development of sounder educational policies has resulted in the improvement of curricula, methods and administration of undergraduate teaching. This phase of medical education has received consistent attention, resulting in the effective utilization of the four-year undergraduate period.

The next step in the sequence of medical education, and the one with which this discussion is concerned, is the after-graduation period, the years in the hospital as an intern, and later, possibly, as a resident or fellow, on through the period of general practice with its postgraduate training. As intensive study of the standards of training in the four-year medical course by the American Medical Association was required to bring about a marked improvement in the medical schools of the country, more and more consideration will have to be given to postgraduate and graduate education if they are to take their rightful place in the whole process of medical education.

Progress in after-graduation study has been made through the requirements for internships and residencies and qualifying examinations for certification in special fields of practice. Inasmuch as there is some confusion in the use of the terms “graduate” and “postgraduate,” it might be well to give the conception of these terms as herein used. By the term “graduate” is meant those longer courses of study designed to prepare for teaching, research and practice of a specialty. This is usually a full-time process under specific direction, and perhaps leading to an academic degree. By the term “postgraduate” I refer to a continuing educational program designed to maintain the practitioner at suitable levels of professional fitness. The postgraduate program is not designed to train specialists, but does contemplate the educational opportunities necessary to maintain the specialist as well as the family doctor at desirable levels of professional efficiency.

Sir William Osler once said, “There are many problems and difficulties in the education of the medical student, but they are not more difficult than the question of the continuous education of the general practitioner. Over the one, we have some control; over the other, none. The specialist may be trusted to take care of himself. The conditions of his existence demand that he be abreast of the times, but the family doctor, the essential factor in the battle, should be carefully nourished by our schools and carefully guarded by the public.” This statement was made by Dr. Osler many years ago when specialists were few in number and

1. Piersol, George Morris: “The Importance of Postgraduate Medical Education.” *Weekly Roster and Medical Digest* 34: 781-783 (Feb. 11), 1939.

their services were among the luxuries of medical practice. Today we might well say of the specialist that the conditions of his existence not only demand that he be abreast of the times, but also that he be nurtured from the same sources as the general practitioner, namely, the centers of teaching and research. Indeed, are not the various medical boards, special societies and medical teaching institutions being utilized for this very purpose?

While the need for keeping the practitioner abreast of the times, for which Osler so eloquently pleads, is recognized and widely discussed, neither the medical school, the hospital, nor any agency interested in medical service has taken on itself the obligation of providing means whereby the proper and continued training of the physician is assured. True, all these agencies are interested and are making contributions, and encouragement is given by Federal and philanthropic sources, but postgraduate training for the general practitioner is still unorganized and desultory, and until this problem is more systematically and judiciously attacked and the major responsibility for its conduct agreed on, the results cannot be expected to be comparable to those in other phases of the educational process. In other words, postgraduate education will still remain in the position it has too long held, that of a poor relation. This should not be true since the major responsibilities for disease prevention and the care of the sick are still functions of the family doctor.

Not until medical education is studied as a whole will each of its phases receive adequate evaluation. A not inconsiderable number of medical teachers find as great, or even greater, satisfaction in guiding the graduate as the undergraduate student, but take somewhat lightly the obligation for the direction of the practitioner. This may readily be understood. The longer and more intimate association of the teacher with undergraduate and graduate students occupies extended periods, while the contacts with the postgraduate student are of much shorter duration and not infrequently quite casual. Then, too, postgraduate teaching in the past has frequently been formless and lacking in direction and, too often, has actually been a commercially arranged repair shop for broken-down doctors. That which is proposed here is a systematic and orderly process of continuing education whereby the cultural and professional lag will be shortened and the physician rendered more capable of offering a quality of service commensurate with the health and economic resources of the community he serves, as well as in keeping with the current position of the art and science of medicine.

The need of provision for postgraduate education was recognized in Michigan by the University Medical School about 60 years ago, when the changes in medical concepts and practices, due largely to the work of Pasteur and Lister, made it necessary to afford opportunities to the graduates of former years to learn of these advances from authoritative sources and to witness the newer procedures. This program continued more or less satisfactorily for about 30 years, when all but the most informal types of postgraduate instruction were discontinued. This postgraduate program must not be confused with the graduate program of the University Medical School. The graduate phase of medical

education in both clinical and preclinical fields was assumed early by the University Medical School and has continued to develop as the divisions of teaching, research and practice have become more clearly defined.

About 20 years ago the Michigan State Medical Society, concerned with the rapidly widening gap between medical knowledge and practice, inaugurated a postgraduate program of its own. This consisted of lectures and discussions, once or twice a year, for from one to three days, in the principal centers of population. While these conferences were helpful and showed satisfactory attendance, few who had given serious thought to the matter expected this casual type of teaching to meet the needs of the profession. It was felt that it might serve to stimulate our members to seek other and more adequate sources of instruction. This did not prove to be the case. There was no increase in the attendance of our members on the more academically arranged courses given in certain medical centers of the country. The State Medical Society then appealed to the Michigan medical schools for advice and assistance in providing for the increasing needs of the practitioner for postgraduate education. The Society requested a program of continuing education under academic direction. The argument was put forward that the University Medical School, as a state tax-supported institution engaged in undergraduate medical education, had a particular obligation to undertake such a program which, after all, was but a continuance of its undergraduate teaching responsibilities, primarily designed to supply competent medical service to the people of the State.

The request of the Society was acceded to by the University of Michigan, contingent on the approval and cooperation of our colleagues in the Detroit College of Medicine and Surgery,* the Michigan State Medical Society, the State Department of Health, and the major hospitals of the State. The postgraduate program in medical education, developed through the cooperation of all these agencies, has functioned twelve years. Last year extramural courses were given in eight centers of the State with an attendance of 1,179 physicians. Fifteen courses in various fields of medical practice were given in the university centers of Detroit and Ann Arbor with an attendance of 870 physicians, making a total of 2,049 physicians enrolled in some form of continuing education in our program last year.

In these programs, while preventive measures and the clinical aspects of disease processes and their management are the major objectives, reviews of the fundamental sciences enter importantly into each presentation. As the program has progressed, more and more requests have come to the program committee for opportunities for study in the basic sciences. As requests for anatomy were the greatest in number, three years ago the Department of Anatomy arranged a course of one day each week during the second semester of 16 weeks for graduates in medicine. There has been a steady increase in interest in this course and last year 105 graduates were enrolled. A senior and two junior members of the anatomy staff assumed the teaching duties.

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Wishing to learn why these physicians took the course, a questionnaire was sent out to the members of the class, as follows:

- 1.—Are you a member of the American College of Surgeons or one of the surgical societies?
- 2.—Are you preparing for the American Board of Surgery?
- 3.—Are you in general practice, including the usual proportion of industrial and accidental injuries, and utilizing this course for greater competency in your practice?

To these questions we have, to date, 81 replies. Nineteen, or approximately 25 per cent, are members of the American College of Surgeons or one of the surgical specialties societies, and took the course as a review. Twenty-nine are preparing for surgery or a surgical specialty. About two-thirds of the 29 are registered in the Graduate School and working toward a Master's Degree in one of the surgical specialties. All of these, however, are working under conditions approved by the various specialty boards. Thirty-three are in general practice and are not planning on specialization, but wished to improve the quality of their work. This particular course has met the approval of both students and instructors, and adds encouragement to further developments in the basic science fields, particularly in physiology and biochemistry.

The response of the medical school to the request that it undertake the responsibility for postgraduate education will often be that its personnel is already over-burdened with undergraduate teaching. While this often may be true, I am visualizing a broader scope of functions for the medical school than the responsibility to the undergraduate alone. An evidence of the assumption of increasing responsibility by the medical school is the number of schools (12) requiring a satisfactory internship for the degree. Because I have in mind this broader scope, I prefer to use the term medical school rather than undergraduate school. With certain adjustments, which in the majority of instances will not be too difficult, the medical school may well serve as the base for the direction of all medical education.

When we began our Michigan program objections to increased responsibility were raised by both our medical schools. However, through a sharing of these added responsibilities by our faculties, together with the inclusion of qualified specialists from the practising profession, the burden of teaching was not greatly increased, and certainly the opportunity for research was not decreased. We have found during twelve years of interesting experience that we have been able to meet the current postgraduate needs with reasonable satisfaction. Moreover, the association of our teaching staffs with postgraduate students has been stimulating and helpful in the planning of undergraduate teaching. An example of this interchange and the inclusion of the specialist not associated with medical school teaching but who is eligible and willing to teach is the autumn extramural program, which is now being given in eight centers for an eight-day period under the aegis of the University of Michigan, Wayne University, the State Department of Health, and the State Medical Society. Of the 27 men engaged

in teaching, nine are from the University of Michigan, six are from Wayne University, and twelve are from the various practising specialty groups, not connected with the teaching profession except through this postgraduate affiliation. In this group, 15 men hold membership in the American College of Physicians and its affiliated special fields, twelve in the American College of Surgeons and allied surgical specialties, including obstetrics and gynecology.

Did time permit there might be some advantage in discussing techniques of program operation. While financial support may be drawn from any source available, I believe its major portion should come from those agencies likely to be involved permanently in the program. These are the profession and the medical school. Although Federal funds might be utilized properly, it would seem best to use them to enlarge but never to replace the basic support of the program, which our experience would indicate should remain always within the control of the teaching and practising profession. Further, the teaching schedules should not be selected by the teaching group alone, but through collaboration with those who are to receive the course. The practising profession should be consulted constantly and no program, no matter how worthily conceived, should be imposed on it. This point is emphasized by the experience in adult education in general in which the conclusion is very generally accepted that extension teaching programs should be in response to needs and demands of local areas and never imposed. The teaching schedule in Michigan is finally decided by a committee representing all the agencies involved, the medical schools, the profession, public health agencies and the hospitals. Consideration is given to the observations, comments and requests of all concerned. In other words, the program is designed to meet the health needs of the community as interpreted by medical and allied agencies and is under the guidance of that portion of the profession which is devoted to teaching, research and practice.

Our experience over the past twelve years seems to confirm the wisdom of the decision of the Michigan State Medical Society to place the responsibility for the direction of postgraduate education in the medical school. In order to safeguard the balance between fundamental knowledge and practice, postgraduate teaching must identify briefly but positively every new procedure with the underlying principles of its operation. Postgraduate medical instruction should be directed by those intimately in touch with the sources of knowledge in their respective fields. In other words, the responsibility for continuing education in medicine should center in the medical school where there are teachers trained to give this emphasis. I believe, with John Dewey, that living together in a closely communicating system of education for the whole medical profession is a sound principle.

DISCUSSION

DR. HAROLD S. DIEHL (University of Minnesota): It occurs to me that I might supplement Dr. Bruce's splendid discussion with a few of our experiences in the field of postgraduate medical education during the past several years.

In Minnesota we had been conducting for many years a certain amount of postgraduate medical education for the physicians of the state. Members of our faculty cooperated with the State Medical Society in offering special courses and lectures to county society groups, and several times a year short courses were given on the campus. Our experience with these efforts, however, was not uniformly satisfactory. It was a great expenditure of time and energy on the part of exceedingly valuable members of our staff to go to these county society meetings, frequently for very small audiences, and we doubted whether the returns justified the sacrifices involved.

The occasional courses on the campus were given in the medical school laboratories and clinics and seriously interfered with the regular instruction of medical students. Furthermore, those who attended divided their interests between the courses they were attending and the amusements and business enterprises of the city.

An opportunity to try something different came about five years ago, when our late President, Dr. Lotus D. Coffman, was instrumental in the construction of a building on the campus which he called the Center for Continuation Study. His reason for desiring such a building was his belief that a university's, or, at least, a state university's, responsibility to its graduates does not end when they leave its halls with diplomas in their hands. The building, which he had constructed, is specifically for the purpose of continuing education, contains lecture rooms, conference rooms, seminar rooms, a library, lounge rooms, dining rooms and living accommodations for about seventy-five people. The building has been in operation for about five years. It occurred to us at once that this idea was particularly applicable to medicine and that these facilities provided us with an opportunity to try something different in continuing medical education.

The first year we experimented with several courses, and we found an excellent response to them. Since that time we have been able to expand our program with the aid of a generous grant from the Commonwealth Fund of New York. This has enabled Dr. W. A. O'Brien, as director of this project, to devote his full time and attention to the development of the program.

Over the past few years, about 40 per cent of the courses given have been in medical, public health or hospital fields. Last year, and during the current year, our program calls for about two courses a month, most of which are one week in length. We have found that most physicians can leave their practices without serious difficulty for about a week at a time. A few courses are three days in length and a few more than one week.

The physicians who attend these courses live in this building. They attend the course programs in the building or in the hospitals during the mornings and afternoons. They have lunch and dinner together, and frequently in the evening they assemble for seminar and discussion groups, participated in by members of the teaching staff.

We have been in an unusually fortunate situation for at least three reasons to carry on this type of enterprise. One is the building, which I have described. Another is that we are in a large metropolitan and medical center, so that we are able to call on a splendid group of clinical teachers who do not carry a major responsibility for the teaching of undergraduates. The third reason is that we have had the whole-hearted cooperation from the staff of the Mayo Foundation in offering this instruction.

Over a period of a year, we find that approximately one-third of the instruction is given by the members of our full-time teaching staff, about one-third by the members of the clinical teaching staff in the Twin Cities, and about one-third by the staff of the Mayo Foundation.

The types of courses we have developed have been based on surveys as to what physicians are interested in. As Dr. Bruce has said, such courses should be developed not on the basis of what the teachers want to give, but by what the need is, what the interest is.

The courses for physicians, exclusive of the hospital group, have fallen into two chief groups—those for the general practitioners (these make up the majority of the courses) and a few for specialists. The courses for the general practitioner may be in several fields. However, we have found it is important to limit the scope of courses, both from the point of view of the men who are attending the courses and those who are conducting them. For the general practitioner, we have had courses on diseases of the blood, courses on kidney diseases, courses on traumatic surgery, etc. The courses for specialists range all the way from one in the general field of ophthalmology to one in diagnostic roentgenology of the nervous system. There was a surprisingly wide interest in this latter highly specialized course. Men attended this course from the East Coast, the West Coast, and from Canada and Florida. Attendance in courses for specialists is limited to men who are already qualified specialists in that group. The attendance at all courses is limited in number to the size of a group that those in charge of the course feel can adequately be accommodated.

Most of our attendance comes from rural and small communities in Minnesota, and from the adjoining states of North and South Dakota, Nebraska, Iowa, and Wisconsin. The largest percentage of physicians who have attended this course in relation to the total population has come from North Dakota, from which state 34 per cent of all licensed physicians have attended one or more of these courses during the past three years.

The response to these courses on the part of practicing physicians has been most gratifying; and we certainly agree with Dr. Bruce in feeling that the medical school has a very real opportunity and obligation to provide for the continuing education of physicians. By so doing, we are making a contribution to the objective for which all our schools exist, namely that of providing the highest possible level of medical practice for the people of our states and regions.

DR. JAMES D. BRUCE (University of Michigan): The program in Michigan has much in common with that of Minnesota. There is, however, one fundamental difference in our philosophy that ties up definitely with the subject matter of the morning's symposium.

In bringing the graduate to a university and teaching center, we are doing a very worthwhile service. There is no question about that and that is part of our practice. In carrying a teaching program into the communities of the state in which the hospitals and the doctors are closely related, we are doing something beyond that. In this development, our programs in the state are all conducted in the hospitals, and one of the purposes, besides making it attractive and convenient for the neighborhood physician, is to emphasize that the hospital is, after all, the place where the more serious diseases and conditions which the physician is called on to treat are dealt with. Furthermore, by bringing in experienced teachers and demonstrating cases within the hospital itself, we feel that we are going a long way toward raising the standard in that local hospital. So we have the additional purpose, which I would like to emphasize and which we think is tremendously worthwhile, of taking our program into the community itself, in the hope that we will there be able to develop that quality of service for which we are all striving.

Teaching of Bacteriology*

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The teacher of bacteriology, one of the subjects more recently introduced into the medical curriculum, can, I am sure, gain a measure of assurance from observing that still open to discussion are problems of teaching pharmacology and anatomy, subjects which surely have a rich historical heritage—a heritage which bacteriology does not enjoy. Thus, if the teaching of bacteriology today fails to meet an ideal program it cannot be for lack of precedents.

May I make it clear, at once, that I do not propose to offer for your consideration *the* method of teaching bacteriology to students engaged in the medical school curriculum; rather, I would suggest that, at the moment, there can be no one method of presenting the subject that would automatically lead to best results. The diverse circumstances which operate to characterize different medical schools preclude the possibility that any single program could succeed in all; in fact, it is possible that a standardization of the technic of teaching bacteriology should be shunned rather than fostered. I might even venture a suggestion that a basic reason why bacteriology does not always more fully meet its obligations is because of a too rigid adherence to some traditional accepted formula of teaching.

For any course in bacteriology to accomplish its purpose—which, as I see it, is adequately to prepare men for the practice of medicine and for extending the bounds of medical science, in so far as the science can contribute to these ends—that course must be based on due consideration of the peculiar conditions surrounding the teacher and the taught—conditions contributed in part by the environment in which the effort is made.

With respect to the first of these elements, that is, the teachers, I suspect that little can be done. Certain it is that any attempt to mould them to a single pattern would be doomed to failure, as it should be, and equally certain would be the failure of any attempt to induce them to apply a single technic in presenting their subject. A method highly successful at the hands of one teacher may be—frequently is—a failure in the hands of another. However, this does not imply that the teacher has no responsibility in the matter of judging critically of his and other technics.

As for those taught, here, again, we encounter a complex problem, and one worthy of most careful consideration in any effort to determine the teaching procedure most likely to yield a maximum return. The prior experience of one student, even in those things which contribute directly to his success in medical work, can hardly have been duplicated by that of another, and as a case in point—a rather aggravated one—may I mention the matter of the so-called pre-

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medical courses in bacteriology. It is not my intent to argue that such courses are, of necessity, wholly bad; in fact, were such courses better I might argue that they would be good, but as they are conducted at the present time—varying from the course which is thoroughly scientific and reasonably comprehensive to the one which is but a smattering of non-essentials, and yet is a course—I feel that they offer no relief to the teacher in the medical school and, in fact, add to his problems. Many other points bearing on the capacities and on the prior training of students merit attention in formulating the scheme of teaching for each school.

Of greatest importance, however, in planning the best program for teaching bacteriology is the environment surrounding the work. By environment, I refer to the particular place which the subject assumes in the sequence of courses comprising the medical curriculum, to the particular educational pattern into which the subject is introduced, and to the attitude toward bacteriology held by those with whom the student will later establish contact. In so far as the medical school is concerned, bacteriology cannot be an end in itself; it should be integrated with the entire medical school program and adapted to that program and to the personnel that is to carry out the successive steps in the program subsequent to exposure of the student to the course in bacteriology. Thus, in some schools it may well be—though it should not—that the entire experience which the student is to gain in the subject is closely limited to the so-called course in bacteriology; in other schools, the course so labeled may be preliminary to a more extended experience where bacteriology is an active interest, not merely a collection of useful technics, in the work of the clinical years. Obviously, a single program cannot well be devised to fit these situations equally well.

Fundamental to the adoption of any program of teaching bacteriology is a determination of what the objective of that teaching should be, that is, should it be designed to produce expert technicians, professional bacteriologists, or practitioners of medicine capable of utilizing the resources of bacteriology in resolving their problems and in guiding their procedures? Further, a decision should be reached as to what should come within the scope of the subject matter presented; where are the lines to be drawn? And, finally, acceptance of a definite point of view is essential; is bacteriology to be taught for the sake of the bacterium or for the sake of the host, that is, is the subject to be offered as an entity complete within itself or should it be treated as dealing with a broader biological problem in which the parasite is but one element and in which the host and its reactions are equally important?

Such questions as these have influenced the plan which we have developed and, while I am fully aware that our program of presenting bacteriology falls far short of an ideal scheme, I venture to comment on some of the methods we have adopted.

Inherent in the program we are following is the idea that bacteriology cannot be taught out of association with the related fields of serology and immunology; that the reactions of the host to the parasite and to its products must be related

to the attributes of the parasite itself. Hence, these subjects are not treated as independent fields of study, each with its own specific course designation. The bacteriology of infection, not solely the bacteria of infection, is offered the student, such a presentation of necessity involving those serological and immunological responses characteristic of the infectious process.

Also basic to our plan is the notion that we are aiming at making neither bacteriologists nor technicians, and that aside from affording the student an opportunity to gain certain factual knowledge we should provide training in observation and in drawing logical deductions from observed facts and phenomena. This implies that teaching, as the word is so often used, is reduced to a minimum, while the opportunity for the student to approach his work as a series of problems requiring a certain precision in methods of attack and clear thinking for a correct interpretation is extended to its maximum. To this end, didactic teaching with textbook assignments is avoided, the plan of asking the student to find in his laboratory material those specific things mentioned in some outline is not followed, and the time that may be devoted to a specific problem is not restricted.

No time is spent in an effort to convert the student into a competent manufacturer of culture media, nor is there insistence that he master technical methods which, today, have no bearing on problems of bacteriological diagnosis and on procedures consequent thereto. It is not argued that technical competency is not helpful, nor that many of the basic principles of historical interest are of no importance; time limitations demand concessions somewhere and it becomes a matter of exercising a choice as to how the time available shall be utilized. Thus, with such a minimal amount of preliminary laboratory work as will enable the student to handle with reasonable safety materials which are potentially dangerous, he is introduced directly to materials containing infectious organisms, each such material presenting to him, in natural surroundings as far as is possible, the infectious agent with respect to which he is to assume the rôle of detective. His is the problem of recovering from this material the organism, or, more frequently, the organisms, of identifying them, of distinguishing the important from the unimportant, and of establishing distinctive characteristics from study of the bacterium isolated rather than from laboring exclusively with so-called typical pure cultures supplied by the laboratory. There are, naturally, instances where such a procedure cannot be followed, and in these cases we must bow to necessity, but that the student will undertake a study of a specimen of pus from a point of view wholly different from his approach to an agar slant is certain.

Having recovered the specific organism from such material, the student, somewhat inclined to regard this organism as his own discovery, turns to an investigation of its reactions in serological systems and of its behavior when confronted by those agencies which we regard as operative in defense mechanisms. It is true, indeed, that the student may not find time to master the technical details of such methods to a degree that would justify full reliance on his work—mastery of such technics is a matter of doing rather than of teaching—but the

mere fact that he may thus gain a comprehension of the uncertainties of such technics may well be as valuable to him later as would be a technical skill which he would never use. For the average medical student it is far more important that he gain a knowledge of the limitations of laboratory methods, that he learn when they are applicable and of service to him and to his patient, than that he become accomplished in producing Endo medium or amboceptor. Fortunately, it is not essential that the student acquire great skill in all laboratory technics in order to grasp their significance or to apprehend the basic principles underlying them.

It must be admitted that this method of developing the subject is not the cheapest as regards materials or the expenditure of time on the part of the group of instructors. The quantities of culture media and of antisera used by the student are far greater than when pure culture methods are employed, and mice, guinea-pigs, and rabbits cost more than do broth and agar. But surely, the added cost can be justified.

For instruction by this method there are two essential conditions; an adequate staff for providing guidance and an unlimited opportunity for the student to avail himself of the facilities of the laboratory. It is our conviction that bacteriological processes, serological reactions, and tests involving animal inoculation should not be regarded solely in the light of the end-result, but rather that progressive changes occur, and that observation of the several steps and of the sequence in these changes may afford a better understanding of what is going on than is to be gained by merely looking at Tuesday's cultures on Friday. As yet, we have not mastered the problem of assuring that material be at the most appropriate state for examination and study at precisely 9 a.m. on Tuesdays, Thursdays and Saturdays, nor can we assure the student that in the incubator nothing of interest ever happens on a Monday. This simply means that our laboratories are open continuously; and it means that they are used continuously. It also means that every day, whether classes are or are not scheduled, instructors are available from whom students may obtain advice.

There is no insistence that all students do the same thing at the same time, and the plan here outlined demands that the students be divided, for laboratory work as well as for conferences, into small groups in which intimate contact can be established between student and instructor.

The general plan of instruction at Yale provides that we, in bacteriology, are not required to apply a specific measure of the accomplishment of the students; that test is applied by those who are to receive them into the work of the clinical years. Thus, we are not involved in the perplexing problems of examinations for advancement. But that does not mean that examination methods find no place in our scheme of teaching, in fact, I may say that we make a very free use of examinations as a method of teaching rather than for measuring accomplishment. Each week, throughout the course, the students are given a series of questions pertinent to the work covered. These questions they answer as they will and when they will, and, I may add, if they will, during the week following.

Then, with the students divided into conference groups, opportunity is given them to compare their recorded answers with a reasonably adequate answer presented by the instructor. In this sort of presentation arises the basis for that free discussion which offers a most effective method of teaching. I may add that the answers prepared by the student never reach the hands of the instructor; the latter is not interested in the answer as such, it is significant to him solely as a means of amplifying a subject and crystallizing an idea.

These, then, are some of the principles on which we attempt to teach bacteriology. Our effort is to present the subject in close association with related fields of study, realizing that what we offer the student is but preliminary to the added experience he will gain subsequently. Recognition of the fact that we cannot possibly develop accomplished bacteriologists demands that emphasis be placed on the principles of bacteriology rather than on the non-essential details of bacteria. We allow the student to study actual bacteria of diseases, as far as is possible in environments and in materials where they are naturally to be found. On the student we place the responsibility for isolating these organisms and for determining, through observation, the attributes of the organism so isolated. To these ends, we afford the student ample materials and advice, and a laboratory always available. The plan inherently encourages the student to believe that factual knowledge is of limited value unless from these facts reasonable inferences can be drawn. And we seek to convince the student that bacteriology is still biology and that the object in pursuing such a study is to gain an insight into the principles of parasitism and its results.

May I revert to my earlier comment. That the plan here outlined will meet the needs of all students or all teachers, or fit into all environments is not to be expected. My plea is not that this scheme of teaching be adopted, but rather that the teacher of bacteriology give to the problem of his teaching the same consideration for environmental influences that he would inevitably apply were he venturing on some program of research in the science itself.

Biotrepy Versus Pharmacology*

PAUL D. LAMSON

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Nashville, Tennessee

It is good of you to allow me to discuss with you the future of one of our medical disciplines, something which, I believe, to be quite different from pharmacology and for which I have suggested a tentative name BIOTREPY, from *bios*, life, and *trepo*, to change.¹ I am told that to introduce a new name, particularly for an idea, is certain to turn everyone against it. But this is not a political speech. I am not urging you to accept something of no value but to discuss seriously some inescapable problems with which we are faced. I believe that there is a difference between the study of drugs—pharmacy, the study of their “action,” which Buchheim called pharmacology, and the study of the body by means of its reaction to chemical substances, which I have called biotrepy. It is about this proposed medical discipline that I wish to speak to you today.

Naturally, you will ask the need of making any change in pharmacology. The sulfanilamides have demonstrated what can be done with drugs. We have, as you know, certain excellent departments of pharmacology and some excellent men who are doing work of the highest type. I know of no group which is more enthusiastic about its work than the pharmacologists. Why, therefore, should we worry? I am not the only pharmacologist who does worry. The fact that we have the most pleasant departments of any is no more reason for believing that they will continue to exist as such, than there was for certain countries, which were well satisfied with what they had, to believe that things would always continue in the same way. Not many years before the advent of sulfanilamide, departments of pharmacology were by no means in a safe and stable position. At present, they are more or less like a small country in which gold has just been discovered. Pharmacology has become so important that everyone wants it, and it may be torn apart.

There is even a strong group among the pharmacologists who are so worried that they feel that if we do not cater, as they put it, to the clinicians, we will lose our independence, but I feel very differently about this. To my mind the age-old dissatisfaction with pharmacology is due to the fact that we have the cart before the horse. We are studying drugs rather than the living organism. The cart is all right and so is the horse. If we reverse their position, we have just what we started with, but we bring about a great change in rate of progress. We must not confuse individual research with the development of an organized medical science. When I explain biotrepy to a pharmacologist, he first says I am crazy, and then that what I propose is just what he is doing. Pharmacologists are all doing biotrepy, but they insist on telling us that they are studying drugs or their actions.

*Read at the Fifty-first Annual Meeting of the Association of American Medical Colleges, held in Ann Arbor, Michigan, October 28-30, 1940.

1. Lamson, P. D.: Suggested Revisions of Medical Pharmacology, *Ann. Int. Med.*, 18:161-186 (July), 1939.

Let us see what the study of drugs and their actions entails. Besides the roots, herbs, leaves, the teas, syrups, infusions, and other mixtures, there is all that makes up *materia medica*, as well as half a million potential drugs. Supposing that one should know the pharmacology of each and arrange these drugs chemically, as in the following table, just what value would such a list have to the practicing physician?

a:a'—Dichloroisopropyl alcohol carbamic ester	Diethylaminolactic nitrile methyl iodide
3:5—Dichlorophenyl arsonic acid	Diethylaminophenylacetoneitrile
3:3—Diethoxy-9-carboxylic acid	Diethyl aniline
Diethylacetamide	Diethyl carbinol
Diethylamine	1:1'—Diethylcarbocyanine iodide
Diethylaminoacetoneitrile	Diethyl ether
Diethylaminolactic nitrile	Diethylglycine-p-amino-o-oxybenzoic acid methyl ester

How among these would he find a substance with which to relax the coronary artery? The United States Pharmacopoeia is a typical example of such a system. There is no object in going to this book to find something for therapeutic use unless one already knows what one goes there to find.

The pharmacologist faces an utterly impossible task. First, he is supposed to know about the action of more than half a million chemical substances, all the drugs, hormones, vitamins, industrial poisons, war gases, etc. It is absurd to speak of some as of value and others as of no value. Sulfanilylguanidine was made, patented and thrown away as being of no value as a chemotherapeutic agent. Recently, Dr. Marshall has shown that this may be as important a drug as any yet discovered. Suppose the pharmacologist recognizes his limitations and concentrates on a few drugs. He should then study the "action" of these few on nerve, muscle, blood and kidney; in malaria, pneumonia, amebiasis, actinomycosis, and on everything known to us in medicine. If he neglects anything, he may miss the one important "action" of the drug. He must become an expert on every tissue, function and chemical process in the whole human organism, in both health and disease, to say nothing of the innumerable parasites. He cannot specialize. This is the second impossibility. The result is that anyone attempting such a study becomes very superficial, and, unfortunately, we have had too many such men in pharmacology.

Finally, the so-called "action" of drugs, that is, practically everything recorded in the pharmacological literature, is not an "action" of the drug at all but the secondary reactions of the organism to some usually unknown primary chemical reaction between the drug and one or more chemical substances in the body. An example is carbon monoxide poisoning. The primary action of carbon monoxide is its chemical reaction with the hemoglobin of the red blood cell. Everything else that happens is simply the reaction of the organism to oxygen lack, and, later, still other changes dependent on this condition. Buchheim's concept, pharmacology, the study of drugs and their "actions," does not allow, on account of its premises, its development as a true medical discipline. If we will admit that pharmacology is nothing but pharmacy, then I have no criticism of it.

After the botanist took from the pharmacist the study of plants, and the chemist took over the study of chemical substances, little seemed left, except the making and dispensing of pharmaceutical preparations; but recently there has been a great revival of pharmacy, and enormous amounts of money have gone into the development of pharmaceutical laboratories. The pharmacists, for financial as well as humanitarian reasons, are trying to find new substances which will have some important use, but what this use turns out to be is of no great interest to them. Also, the organic chemists are realizing the commercial value of therapeutic substances. All of these men want to know what their particular pet substance will do in medicine, but they are not biologists and their interests are not the same as ours.

As you are well aware, those of us in medicine form a special group, set apart from all other branches of the university for the purely practical purpose of preventing and curing disease in man. We are not general biologists, physicists, or chemists. We are all doing the same thing, regardless of what medical discipline we happen to be in. We have become divided into groups more on account of the tools and methods which we use for our investigation than on account of what we are studying. Nothing so insults a surgeon as to speak to him of technic. He is a physiologist, biochemist and pathologist studying the response of the organism to his operations.

In biotropy, I am suggesting that we use a special set of tools with which to study the body and apply the method which the chemist uses in working out the structure of invisible molecules. This he does by allowing his unknown, his crystalline substance, to react with known chemical substances, and through a series of such reactions he is able to tell us the structure of his unknown. It is in this manner that organic chemistry has been built up. Using this same method and allowing the body to react with innumerable chemical substances, we may eventually throw some light on the structure and composition of cells and the processes by which they react. It is, at present, difficult to think of another way in which this information will be obtained. But, for years to come, the secondary reactions of the organism, such as hypnosis, increased cardiac output, etc., will, in most cases, be as far as we are able to go.

The systematic study of the organism's reaction to chemical substances is no simple matter. It may, however, be accomplished if we will adopt a different concept of the living organism than that customarily held; that is, to think of the body as a great community of cells of different orders, genera, species, varieties and types, as nerve and bone cells, smooth, cardiac and skeletal muscle cells, etc.; that is, cells which are specific entities, no matter where they may be located. We may compare this with a zoological concept of the animals of a continent, its birds, fishes and beasts.

Another matter of great importance in the development of a science is a systematic method of recording data. This may be accomplished in biotropy by utilizing the above concept of the organism. All primary reactions might be recorded under the cell types which react to any given substance.

MUSCLE

*Cardiac**Metabolism depressed by*

Arsenic: reacts with glutathione. Voegtlin, Dyer & Leonard:
U. S. Public Health Reports, 33:1882, 1923

Conductivity depressed by

Ephedrine: (dog & rabbit) electrocardiographic studies. Chen
and Meek: *J. Pharmacol. and Exper. Therap.*, 28:31, 1926.

Contractility increased by

Digitalis: (dog) optical recording of intraventricular pressure.
Wiggers and Stimson: *J. Pharmacol. and Exper. Therap.*,
30:263, 1926.

Irritability decreased by

Acetyl-methylcholine: (man) Starr: *Am. J. Med. Sc.*, 186:330,
1933.

Refractivity increased by

Quinidine: (turtle) muscle strips. Wedd: *Am. J. Physiol.*,
108:265, 1934.

Rhythmicity rate increased by

Caffeine: (rabbit) perfused heart. Heathcote: *J. Pharmacol. and
Exper. Therap.*, 16:327, 1921.

Secondary, unanalyzed reactions of the whole organism, as metabolism, of systems, as blood pressure, of organs, etc., could be arranged alphabetically under the factor involved, as metabolism, blood pressure, liver, etc. Such a systematic plan may seem of no great consequence, but it was the realization of the failure of Buchheim's system, his recognition of the absolute need of system, and his acknowledged inability to devise one for pharmacology that made Schmiedeberg give up an attempt to treat pharmacology as a science and instead to reluctantly write a purely practical book for students and practitioners.

So much for the general idea of studying the body rather than the drug. Now let us see if the substitution of such a plan for that of the pharmacologist would have any direct effect on those now working in pharmacology. The field would be as enormous and as impossible to encompass as is pharmacology, but in it one could specialize on any type of tissue or body reaction in either health or disease. A life's work of such specialization would result in the development of new methods of study, a broad interest in the physiology and pathology of this tissue as well as diseases involving it, and a knowledge of the basic facts needed for the therapy of such conditions. One could, at last, become an expert on muscle, anesthesia, or the therapy of pneumococcal, streptococcal, or syphilitic infections.

I hope that you will not confuse a system of study and the study itself, as many have done. True, it is that the ultimate aim of all medicine is the cure of

disease and that we may cure disease as we do pneumonia with sulfapyridine without the remotest idea of how this drug acts. But, besides blindly finding new drugs we want to know about the body and those units, the cells, of which it is made. We have made so little progress in this that it is practically no beginning at all. This field of cellular biology, studied in this biotrepological manner, offers untold opportunities for this, and, obviously, any observed reaction of the organism to a chemical substance has potential therapeutic possibilities.

Time will not permit a discussion of the teaching of biotrepology, but one can, I think, picture a well-developed course where everything would begin with a consideration of the tissues, rather than drugs, their subdivision, their location in the body, their functions, a general review of their pathology, and the different diseases in which they are affected or play a part. One would, then, consider those substances thought to affect these tissues directly and the secondary results of reaction of a cell type to these drugs. Finally, one would take up pathological conditions and consider the relative therapeutic merits of the entire group of substances known to affect this one cell type, not only in their relation to this type of cell but to the reaction of the other cells of the organism. If one thinks of smooth muscle, the different types in the bronchi, vascular system, gut, ureters and uterus, and how one may affect this tissue with drugs, the above idea will be obvious enough.

Laboratory exercises could be built systematically about this tissue concept of the organism and methods of studying the reaction of cell types demonstrated. The training of men cannot be gone into here, but I have found by experience that it is possible for men of early age to acquire a very sound knowledge of chemistry, physics, mathematics and medicine, and be ready for a biotrepological career. The only difficulty is in obtaining funds for such educational pursuits. Education seems always to be the last on our lists of useful occupations.

Would it not be well to recognize the impossibility of keeping up and do something about it? Medicine is not an abstract science. It is very essential that the student, or one's physician, should have heard of pneumonia, of sulfathiazole, and also, unfortunately, of *macrocantherincus hirudinaceous*, oxazolidiones, and countless thousands of other matters. If our knowledge of medicine continues to increase, as it has in the past few years, it will not be long before any patient would die of old age before his physician could even enumerate the facts known about his condition and the factors involved in its treatment.

My suggestion is that we substitute for a high percentage of didactic lectures talking motion picture lectures which might be developed according to the following universal plan. In biotrepology, for example, a committee would be chosen from the best men in the field, who would be responsible for the lectures. Obviously, a choice of subjects would have to be made, and this choice would be the composite opinion of the best biotrepologists as to what should be taken up with the students of a given year in the time allotted. This democratic decision would average better according to our present concepts than any other. This group would, then, choose lecturers for their ability to lecture as well as for their general ability, and their lectures would be edited and revised until found

satisfactory. There would be illustrated laboratory experiments, tabular data, etc., and these at least summarized with the proper illustrations in a textbook which might be considered the "bible" of biotropy for a given year. Such a plan would be based on the assumption that these same lectures would be given on a cooperative plan in all our schools of medicine throughout the country. They would be criticized by the students and professors in the different universities and revised for the next year. After a short time, a very excellent series would be provided.

Such lectures would have certain effects. Students would get the best there was, regardless of their location. They would see and be stimulated by men from different parts of the country (perhaps sometimes the world) and obtain an idea of standards. After graduation, they could obtain each year an up-to-date, simple book on each medical subject.

The work of the professor would by no means be taken away from him. He would still give lectures on certain subjects with which he is thoroughly familiar. He would, however, be relieved of the moral responsibility of giving the student the truth on subjects about which he knew next to nothing. His work would be made much more possible but more exacting than ever. He would be forced to keep up on these lectures and with his whole subject, in a general way, and be able to discuss them with the students. To the intellectual man such lectures by his colleagues would be a great delight. For the first time, there would be some logical reason for the professor's wishing to follow his subject. Men in the clinical branches have much routine; they are forced to see their patients daily, and all manner of diseases are automatically brought before them, but the pharmacologist can retire into his corner, and there is nothing which forces him into any sort of routine. On ward rounds he discovers that 99 per cent of the discussion is centered about rare cases and physical or differential diagnoses. He has more experimental work on his hands than he is able to take care of and soon retires to his laboratory once more. The end result is that pharmacologists and the very best of them admit that their only interest is in their experimental work and that the students must get on as best they can. Unless we train men in a specific way and unless we develop a branch of medicine in such a manner that it is indispensable, such departments will cease to exist. We should by no means force routine on the professor but instead give him more free time and less general responsibility if we wish to obtain from him the greatest productive thought. Keeping up broadens but weakens him for concentration. The above plan might be a time saving and highly economical compromise.

Finally, there is one other matter which deserves serious consideration. Thousands of new chemical substances are being made, tested very roughly for their so-called pharmacological action, and the so-called "inactive" ones are discarded. We do not realize how many hundreds of thousands of dollars go into the synthesis of these chemical substances and into the carrying out of the animal experiments which may have shown them to be useless in a certain condition but which in no way shows that they might not be of great value in other conditions.

Some system should be developed for the cataloguing of reactions of the organism to drugs. Just how this should be done, I do not pretend to say, but it is, I think, obvious that any of us in medicine who wish to treat a given condition with a drug will want to find it under some biological heading rather than among a list of chemical substances. I believe that it will be possible some day to arrange a biotrepological index under which the enormous number of facts which are being discovered about the reaction of the organism to drugs may be arranged. The subject is so immense that no one will disturb himself to do anything about it unless he must. But the chemists, the pharmacists and the medical group will find, before long, that so much money is being thrown away that it will become necessary to act. It is one of the pressing problems of the present time, and the sooner something is done about it the better. The organic chemists were faced with similar problems and solved them.

To sum up these various ideas—my first suggestion is that we recognize that all of us in medicine, with the exception of the pharmacologist, are doing the same thing. We are all studying the body, but the pharmacologist still tells us that he is studying drugs. Next, there is need for a department which studies the body by means of its reaction to chemical substances; that such a medical discipline can be organized systematically around a cellular concept of the organism and should take the place of pharmacology. It would form a true medical science and not merely a practical art such as chemotherapy is. It should not bear the name therapy because it is larger than this. It should not bear the name pharmacology as this by definition means the study of drugs.

Pharmacology, which really is pharmacy, will be practiced by the pharmacists outside of schools of medicine. Through them enormous advances in medicine will be made, but this does not make pharmacy a medical discipline. If these companies or organic chemical laboratories begin to study pneumonia and its therapy, they are no longer doing pharmacology but biotrepology. No matter what they do, it will be for the good of medicine.

On account of the almost infinite number of cell types which make up the organism, the enormous number of functions which these cells possess, and the infinite number of substances with which body cells may react, it is utterly impossible for anyone to cover this field singly. On this account, it is suggested that professors be relieved of this impossibility and that for teaching purposes talking motion picture lectures, giving the composite ideas of a representative group of biotrepologists, be developed and used throughout all medical schools in this country and possibly later in the world. It is further suggested that the same plan be carried out in other medical disciplines.

It is also suggested that our immediate attention be directed to the proper cataloguing of the reaction of the organism to chemical substances in order that the immense amount of material which is being gathered through experimental work is not lost to us.

Although biotrepological studies are being taken up by all branches of medicine, it does not obviate the necessity of having a department which will become

the custodian of this immense amount of information. Departments developed along these lines will need men with very special training for which more funds will be necessary than are at present allowed departments of pharmacology.

The immensity of our problem is not generally realized. The chemists, the pharmacists, and many of the medical men of the world are going to make endless substances for therapeutic purposes. These men, among whom may be found our top scientists, are soon going to find that the pharmacologist cannot be an expert on the "action" of drugs. They are going to demand expert advice, and experts will be developed. These experts will come from men trained as biotrepists, and they will have expert knowledge of the reaction of some part or function of the organism to chemical substances, but not all parts, although they will have had general experience in the problems involved in the study of the reaction of the entire organism to drugs. If one has any doubts about such a plan for the future, one need only think about pharmacology of the present. Do you not think almost entirely in biotrepological terms as of vasoconstrictors, antiseptics, hypnotics, etc., that is, groups of heterogeneous chemical substances to which some single part of the body reacts in a similar manner? And among the pharmacologists with whom you are acquainted, are not the most distinguished those who have attempted to bring about certain desired reactions of the organism by means of drugs, as diuresis, anesthesia, or hypnosis, or others who have attempted or succeeded in curing diseases caused by invading organisms, such as syphilis, pneumonia, leprosy, rather than those who have studied superficially the so-called "action" of one drug after another?

We have not really grasped the idea that we, the pharmacologists, have the keys to the secrets of the body in our drugs. We are so bound up in convention that we think in terms of the action of drugs in spite of all of our best pharmacologists recognizing that we are studying the reaction of the organism. My plea is that you do not drop departments of pharmacology and cover the requirements by giving men titles of pharmacologists who have no laboratories, no money, and no training; that you do not be led astray by the wonders of chemotherapy and set up separate and expensive departments of this sort when chemotherapy is nothing but one phase of biotrep; that you do not set up within already existing departments of medicine, surgery, biochemistry, or public health, great groups for specialized studies in chemotherapy; but, instead, I urge you to concentrate your efforts in building a strong department for the study of the organism—both the human and the parasitic—by means of its reaction to chemical substances. This does not mean the withdrawal of support for those already working on such problems, but it does mean obviating the scattering of funds and of men who, if gathered in one first class experimental department, could produce something of very great value.

The pharmacologists have for generations told you who are responsible for our medical schools, of the possibilities in drug therapy, but they have been laughed to scorn. You have built modern schools with no provision for departments of pharmacology. In other schools you have seriously considered closing

existing departments of pharmacology. You have inadequately supported all departments of pharmacology. Now you are "caught short" when drugs have been proven to cure our worst diseases. You are short of men, money and proper equipment. This may sound almost like criticism, but instead it is praise of the highest sort. You have been wise enough not to invest in pharmacology, which you have reflexly, if in no other way, realized was a failure. You have been waiting—waiting for the proper moment and the proper opportunity to arrive before making your commitments. The time is ripe; the opportunity is here. It is modesty alone that prevents my mentioning it by name. But it is a safe and sure investment in which you cannot go wrong.

Muddling Through

Few are the men who at times do not make
Some humbling blunder, some blushing mistake,
But worse than to err is never to make
Attempt to create for fear of mistake.

It should be proclaimed because it is true,
Mistakes are oft useful, make many grow
In patience, in kindness, and should imbue
With humility the greatest virtue.

Patient persistence may lead to genius
Humility's the talent most gracious,
Patience may stumble, and rise to show us
A blessing disguised is such stimulus.

Blunders all tend to produce sympathy
For the muddling mass of humanity,
Error that generates true charity
Is not a mistake in reality.

Humility is the badge of the strong
Who have the courage to say so when wrong,
Its virtue has charm and tones like a song,
Those who keeping hoping, and muddling along

H. A.

The Teaching of Anatomy*

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Apart from my experience of thirty-eight years in teaching anatomy, gross and microscopic, possibly I may further qualify to speak on the subject by stating that I was a student of anatomy and wrote my doctors thesis under His and Spalteholz, in Leipzig, and later as a member of the Department of Anatomy of Johns Hopkins University I had the opportunity of observing the methods of Mall and his staff, consisting of Harrison, Bardeen, Lewis, Sabin and Knower.

While an assistant in physiology at Cornell University from 1898 to 1900, I was unable to meet the scheduled laboratory periods in gross anatomy but was permitted to do my dissections at odd times, vacation periods, etc. I thus had the valuable experience of learning anatomy under the inspiration of, rather than the direct instruction of, the excellent anatomy staff.

As a result of these personal experiences, I am strongly of the opinion that the major function of the teacher of anatomy is as a catalyzer. He is necessary as an organizer of the work of the department, a director of attack on subject matter, but as a teacher his task may easily be overdone. Particularly, is this true in these days when 97.6 per cent of freshman medical students have had three or more years of collegiate work, and drill methods of instruction are undesirable. While some of these students acclaim the instructor who spoon feeds them, for their own development they should have the experience of standing on their own feet and finding their own way in this interesting and important field of learning.

The major objective of a course in human anatomy is the acquisition, by the student, of a reasonable knowledge and understanding of the structure of the human body, its function and development, to the end that its pathology may be understood and proper steps may be initiated for the restoration of normal function.

A knowledge of structure is not enough. The major features of the structure of the circulatory system were known many centuries before they were understood. The very name, "artery," meaning "air carrier" indicates how little this structure was understood prior to Harvey's epoch making work.

Understanding of a structure involves some appreciation of its function. Function is, of course, the recognized field of physiology. Many physiological considerations, such as the action of muscles, follow so obviously on knowledge of structure, that they are left to be covered in a few words by the anatomist. To teach myology or arthrology without attention to function is to overlook the fact that the student should be interested in a dynamic anatomy, in a normally functioning living human body.

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One may know the cartilages of the larynx, their articulations and muscular attachments and still have little of the understanding which is secured if the organ is studied with reference to the interesting manner in which its muscles pull, and its parts change their relationships, in subserving its major functions.

In other instances, not physiology, but embryology must be called to our aid, as, in explaining the course of the recurrent laryngeal nerves, an open foramen ovale, cleft palate, hare lip, an undescended testis, congenital inguinal hernia, anomalies of the venous system, etc., etc.

Though one can see the action of the sympathetic and parasympathetic elements of the autonomic nervous system on the radial and circular fibers, respectively, of the iris, one must go to the clinic and see a case of bronchial asthma, or the blanched finger tips in Raynaud's disease, or a case of hyperhidrosis; must see the results of the disturbance of the autonomic nervous system in order to understand fully and to appreciate the important part it plays in normal body economy.

In review, then, let me say—the teacher of anatomy is concerned that his pupils shall acquire not merely a knowledge of structure but an understanding of structure as well, and to that end he calls on physiology, embryology, pathology and the clinic as aids to their understanding.

However, since the time allotted for the teaching of anatomy is none too great, undue emphasis on any one of these auxiliaries of instruction would be at a loss of the major purpose of the course. This observation, I think, is particularly applicable to clinical emphasis in teaching freshman anatomy since most schools set aside certain hours in the Sophomore or Junior years for clinical or surgical anatomy.

THE CADAVER

The cadaver is, of course, a necessity in the study and teaching of anatomy. During nearly all of the forty years of this century, state anatomical laws have made provision for a reasonably adequate cadaver supply. This has made it possible to drop the practice of the nineteenth century, still common in Europe, of assigning eight or ten students to a single cadaver. Our ideal, generally realized in the United States, is to have each student dissect one lateral half of a human body.

There are, however, two growing threats to the adequacy of this supply.

1. The first of these is the pressure on hospitals to increase the percentage of hospital deaths brought to autopsy, which, practically, always renders the body useless for anatomical purposes, since a good embalming is no longer possible. The effect of this conflict of interests has been to lessen the number of bodies available for anatomical purposes. Sympathetic cooperation of hospital superintendents with our state anatomical boards is necessary for the solution of this difficulty. As secretary of the Indiana State Anatomical Board I am pleased to state that we have secured that cooperation.

2. The second threat to a continued, adequate cadaver supply, is the Public Welfare Act under which certain individuals are removed from County Infir-

aries, put on relief, and given interment at death. This procedure, of course, reduces, materially, the population from which an anatomical supply comes. The powerful influence of the Director of Public Welfare, in urging on the superintendents of state institutions full cooperation in carrying out the provisions of the State Anatomical Law, will go far toward minimizing this threat.

And now we find a new call for cadavers for post graduate instruction of interns, residents and physicians.

It must be understood, however, that the opportunity and, indeed, the responsibility of the teacher of gross anatomy is not limited to the factual matter involved, enormous as this appears to the beginner. It extends to the vocabulary of anatomical terms which constitute a language assignment heavier than the student has ever experienced.

VOCABULARY

Every science requires and has a certain vocabulary consisting of terms accumulated during the centuries of its existence and used generally and finally more or less universally in writing or speaking about it. This is eminently true of anatomy with its five thousand anatomical terms making up the Basel nomina anatomica, adopted in 1895. Prior to that date confusion was great. There were often six or seven synonyms, each having its defenders. Questions of priority of description, of appropriateness of the term, etc., were involved, and given a nationalistic turn in that English anatomists accustomed to a term some fellow anatomist had proposed, had a definite preference for that term, and the Germans and other nationalities likewise. I attended a meeting of the German anatomical association, in 1901, and on two separate occasions the presiding officer had to ask discussants, who had become controversial, to go out into the hallway and settle their dispute in order that he might proceed with the scheduled program. In most such cases it was discovered their disagreement was not so much in their understanding of the structure under consideration as in the nomenclature employed. So, the appointment of an international committee on nomenclature was a great forward step and it was, of course, natural that, intended to be international, it should consist of Latin and Greek terms, about 95 per cent Latin. The Birmingham nomenclature is an unfortunate backward step which does not even have the merit of being national and has little or no chance of being international.

Very few American students come to a study of medicine with a training in Latin and Greek which enables them to crack open a simple word, identify its parts and stick them together again with an understanding of the word not improved by use of a dictionary. Premedical students can get courses in etymology which will help them develop the habit of seeking for the meaning of words in their derivation, and it is my judgment that in the teaching of anatomy this is a procedure which contributes to the acquisition and retention of an anatomical vocabulary. An anatomical vocabulary, however, is only abracadabra unless terms are definitely associated with the anatomical structures named or described. Let me give an illustration of what I mean:

Several years ago, I was examining a student orally, for advanced standing in anatomy. I picked up a cross section of a kidney, so obviously kidney shaped he recognized it grossly. Putting the slide under a low power objective, I noted a beautiful cross section of the renal artery showing its coats as graphically as the most gaudy textbook illustration. It just filled the field of the $\frac{1}{8}$ inch objective. It was so beautiful I said to the applicant, "just look down this microscope and tell me what you see." He looked—and to my amazement told me that he saw kidney pyramids, loops of Henle, collecting tubules, glomeruli, etc., etc., and all there was visible was a beautiful cross section of the renal artery.

Now, how may anatomy be taught so we may avoid such tragedies?

In teaching gross anatomy, we, at Indiana University, have for many years regarded the demonstration as of greatest importance in our instruction. Once a week, through a semester and one-half, 24 weeks, groups of six students demonstrate their dissections of the past week. The instructor is on guard to prevent the demonstration degenerating into a mere recitation of text. The demonstration lasts fifty minutes or one hour, and students learn much besides anatomy. The use of anatomical terms helps fix them in mind. The use of non-anatomical terms, such as "above," "below," etc., is checked. The student gradually acquires a logical presentation of subject matter, which later serves him well in presentation of a clinical case. He is urged to formulate, in advance of the demonstration, a brief outline of the subject matter to be presented, with major headings and subdivisions. We believe that this constitutes an important collateral element of good instruction in anatomy. The student learns that not all anatomical detail has the same importance; that every student should know certain subject matter; that certain other subject matter should be understood but the details may safely be left for storage in the textbook to which reference may be made, if need arises, without the interests of the patient suffering in the least.

The specialist in a field of practice will need and acquire anatomical details far beyond the capacity of the beginning student. Such details are not ordinarily for the freshman medical student, but for the resident preparing for specialization.

In review, then, the major objective of instruction in anatomy is to enable students to acquire a reasonably good understanding of the structure of the human body, but, very important collateral elements of that instruction involve the development of the individual as a student, by increasing his capacity for accuracy of observation and deduction, and clearness and conciseness of expression.

CROSS SECTION ANATOMY

Cross sections, as an aid in the study of gross anatomy, are very valuable for orientation with reference to relations of various structures. For many years, most schools have had cross sections, and some, sagittal sections of the human body. The making of such sections, twenty-five years ago, was accomplished in the simplest manner by exposing a cadaver on a building roof in subzero

weather, and then cutting sections with a high clearance, fine toothed buck saw. With modern refrigerating units and 16 foot metal cutting band saws, ten teeth to the inch, the preparation of such sections is not dependent on outside temperature.

The preservation of body cross sections has always been a greater problem than their preparation. Happily, the aluminum containers, with plate glass covers, have met well the problem of preservation for display.

Such sections should be on display, if possible, on the same floor and in close proximity to the dissecting room, so that they are readily accessible.

X-RAY ANATOMY

With the erection, in 1937, of the new medical building for anatomy and physiology at Indiana University, a room was set aside, immediately adjacent to the dissecting room, for a library of X-Ray plates. Three simple displayers and a stereoscopic displayer are available. This opportunity, during dissection, of seeing how various structures appear in X-Ray films, lays the background for the use of this marvelous aid to the study of the anatomy of living persons at a later date.

CLINICAL EMPHASIS IN TEACHING ANATOMY

At the beginning of this century, teachers of anatomy, with few exceptions, were clinicians. With the introduction of the full time teacher of anatomy, and its development as an abstract science, less emphasis was laid on clinical applications and greater emphasis on fundamental considerations of structure. In order to preserve the obvious values of the clinical applications of anatomy, a course in applied, clinical, topographical or surgical anatomy was introduced in the sophomore or junior year of most medical schools and excellent texts were developed, some of which have passed through a series of revisions.

In his "Foreword" to Callander's *Surgical Anatomy*, Dean Lewis says, "as early as the second year we should attempt to develop an interest in anatomy which has a direct application to the clinic."

Most surgeons and clinicians agree that the major objective of the course in anatomy should be a fundamental training in systemic anatomy. They hold that when this fundamental training has been given, it is easy, in a lecture or two, to review and emphasize the special anatomical considerations involved in the special field the clinician may represent, whereas the task is more difficult and much more time-consuming if this fundamental training has been missed.

Most cadavers show some gross pathology. That is why they are cadavers. It is stimulating to student interest in brief discussion to direct attention to the clinical interpretation of the adhesions following a pleurisy; of incompetent cardiac valves with resulting cardiac dilation or hypertrophy; of a ruptured aneurysm, a hernia, and many other pathological conditions found in the dissecting room. The teaching of applied, or surgical anatomy, however, is not the purpose of the course for freshmen. If clinical considerations are over-emphasized, fundamental anatomical instruction is weakened.

Such clinical considerations as receive attention are best presented by a staff member who is an M.D. The teacher of anatomy who is not an M.D. is likely to emphasize the rare or unusual rather than the obvious as found in cadavers under dissection.

I came to the teaching of anatomy as an M.D. and I think it very desirable to have M.Ds., even practitioners, on the instructional staff in anatomy. But there are too many good teachers of anatomy with the Ph.D. degree to justify the view that the teacher of anatomy must be a doctor of medicine.

THE LECTURE

I desire to make brief reference to the lecture in teaching gross anatomy.

I have the catalogue of one of the excellent medical schools of forty years ago. In gross anatomy there were scheduled two lectures per day, six days per week, for the freshman year.

In Munich, in 1910, I heard Reichert lecture to six hundred students of gross anatomy. Large classes and gross anatomy, chiefly by lecture, was common in Europe up to a few years ago. I cannot speak for very recent years.

With excellent textbooks, atlases and adequate anatomical material here in America, the lectures in teaching gross anatomy have been reduced to one or two per week for a semester. These lectures are usually accompanied by projection of illustrative matter, enriching, rather than duplicating, subject matter of good texts.

This is in line with good instruction in anatomy as found in America today.

Up to this point I have considered the teaching of gross anatomy. I feel I should not conclude this paper without a brief reference to other divisions of the subject.

HISTOLOGY

In the teaching of microscopic anatomy, students should be given well stained and preferably mounted sections for study. Microscopic technique should be an elective course, independent of the course in microscopic anatomy.

EMBRYOLOGY

Instruction in embryology should include embryology of a mammal, the pig usually being most accessible for serial sections for class use.

NEUTRAL ANATOMY

I feel that there is a growing demand for better training in the anatomy of the central nervous system. Human brains, cut in coronal, sagittal and horizontal planes, contribute much to the understanding of the gross structure of the central nervous system, but for an understanding of the finer structure of the brain and cord, a series of sections, fifty microns thick and stained by the Weigert-Pal method, should be available.

In preparation of such a series, the brain should be fixed, in situ, by injection of a 10 per cent solution of formaldehyde. Then, it should be removed and trimmed to such size as is desired, say four and one-half inches across, which will

include the internal capsule and insula on each side. It should, then, be placed on cotton in a gallon jar, well filled with potassium dichromate or Mueller's fluid, changed at intervals for three months. The further steps of this wellknown technique should be deliberate. Some months should be given to infiltration with thin and thick celloidin and the block should finally be imbedded in celloidin.

Since the sections should be bilaterally symmetrical, care is necessary to maintain the sections in series and right side up.

The whole procedure is tedious. But once prepared it is done for a life time. I prepared such a series and used it first in 1905. From two to three groups of students each year for thirty-five years, have used these sections and they are still good. The student's interest is stimulated because he looks not at a mere picture of a tract or nucleus but at the actual fibers and cells which once functioned in a living human being. It is an advantage to use mica covers, instead of glass, for the large sections. They do not break if a slide is dropped and cracks. The section and cover can be transferred to a new slide, thus preserving the section and series. The sections can be projected for class demonstrations.

During the Medical Aptitude Test

What demon drives all these young men who seek
To be physicians? What sets them apart
To serve America with healing art?
Russian, Italian, German, Czech, or Greek,
Have they, besides the common tongue they speak,
Some spark in common, some electric start
Of sympathy inspiring head and heart
To ease the anguish of the proud, the meek,
The poor, the rich, the freeman and the slave,
All folk who suffer under Nature's laws,
No matter whose the fault or what the cause?

Like God who wonders at the life he gave
To transitory things of flesh and breath,
These in their pride dare hope to postpone Death

Robert C. Whitford

Some Observations on the Teaching of Pharmacology*

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The recent recrudescence of interest in pharmacotherapy has directed greater attention to undergraduate pharmacology and made it the recipient of some adverse comment. Among the important results achieved by discussions of this subject before this and other associations has been more widespread appreciation of the fact that some of the real difficulties are beyond the control of the pharmacologist, some weaknesses have been eliminated, and some complaints have been found to lack substantial basis.

The following phases of organization and departmental procedure have been subjected to adverse criticism: the detrimental effect of combined departments on pharmacology; the meagerness of budgets, as reflected in limited research programs and minimum personnel; the unattractiveness of pharmacology as an academic career under existing conditions; the requirements for departmental leadership; the alleged high incidence of failures in this subject before examining boards; the assertion that the therapeutics of undergraduate years is replaced by distinctly inferior brands shortly after graduation. These examples are typical of many other complaints.

This paper makes no pretense of examining the crucial problems of pharmacology and accordingly advocates no drastic revision. Reference will be made to some practices regarded as inappropriate with the intention of correcting some minor faults. As a matter of fact, the important problems in this field have been adequately discussed in your meetings and journal so that the major issues have been defined. Most teachers continue to employ methods which are individually successful, revising them as experience and added knowledge demand. This individuality is also reflected institutionally: one curriculum is rigid while another contains hundreds of "free hours;" one college allots less than 100 hours to pharmacology, another nearly 300 hours. Since radical suggestions may not be applicable to particular situations, it has seemed more profitable to discuss minor adjustments which may find adoption.

A very significant element in teaching pharmacology is the method of approach, for the conception of the problem is an important factor in determining the character of the results. The choice of a given method of approach introduces an element of selection which exerts a very profound influence on the direction of emphasis. While the course in pharmacology can perform a number of important functions, its specific task, in the undergraduate medical curriculum, would appear to be the establishment of a firm basis for sound therapeutics. If this objective is not attained, the department has not fulfilled its primary obligation, although it may succeed admirably in other directions.

*Read at the Fifty-first Annual Meeting of the Association of American Medical Colleges, held in Ann Arbor, Michigan, October 28-30, 1940.

If this premise is acceptable, there is a vast amount of material, at times included in undergraduate pharmacology, whose deletion would not entail appreciable loss. Synthetic organic chemistry, deservedly popular, represents a case in point. In standard work on pharmacology, whose value as a textbook is attested by eight editions, opened by chance to the article on quinine, the first paragraph encountered by the eye read as follows:

"From a chemical point of view it is convenient to consider quinine and all of its derivatives as derived from a parent substance named ruban.

"Ruban is 4-quinolyquinuclidine. It is composed of:

- (a) A 6-methoxylquinoline ring
- (b) A secondary alcoholic connecting bridge CH.OH in the position 4 of the quinoline nucleus.
- (c) A basic dicyclic portion, consisting of a bridged piperidine or quinuclidine ring."

Of the seven pages devoted to a consideration of the pharmacology of quinine, three consist of material of the type just quoted.

While such information is entirely germane to pharmacology, the intricacies of the structural formulae are irrelevant, confusing, devoid of interest and defeat any possible interest a sophomore medical student might possess. A part of a single lecture devoted to a general discussion of the relation between the physico-chemical structure and the action of a drug may be illuminating and valuable. While it is possible that the method mentioned above might prove useful in the hands of a particular worker, its appropriateness for those who do not intend to become chemists or pharmacologists, that is, for most students, seems dubious. The same might be said of a large part of materia medica, of pharmaceutical procedures and numerous other subjects.

On the other hand, it is essential to inculcate pharmacological principles in an unmistakable and unforgettable manner. It is immaterial whether these principles are discussed in connection with so-called general pharmacology or with remarks on individual drugs. The important point is that they find consideration as general principles. The role of cell surface in drug action, permeability, actions in and on cells, storage, cumulation, idiosyncrasy, tolerance and excretion, illustrate some of the points involved. Naturally, these subjects are mentioned in every course of pharmacology; they merit presentation in a manner calculated to challenge interest and to provide a broad understanding.

The number of these subjects introduced and the best time for their elaboration depends on a variety of factors. Certainly, as many as possible ought to find discussion and their early treatment often proves advantageous. If a student can be taught the method of pharmacological analysis early, that is, if he can be made to realize exactly how it is known that curare acts on the motor nerve endings, if the mechanism of drug effect is taught from the beginning, there is less emphasis on memory and a greater demand for understanding. If drugs are considered in terms of mechanism, comprehension of related problems is facilitated; the action of tetanus toxin on the spinal cord, practically identical with that of strychnine, is readily appreciated and the transition to clinical medicine more easily accomplished. Likewise, an early appreciation of the conditions which

modify the effects of drugs will anticipate and eliminate considerable confusion when substances are studied which induce two oppositely directed series of responses. Considered from this angle, "general pharmacology" ceases to perform a mere introductory function and becomes an important, integral part of pharmacology. As a matter of fact, the restatement of these phases of general biology in terms of pharmacology, by substituting drugs for other types of stimuli, clarifies many aspects of physiology for the student. Since physiology and pharmacology are two aspects of the same thing, the removal of artificial barriers simplifies the tasks of both departments.

A proper division of labor often provides the time needed for the presentation of general pharmacology, permits correlation and secures the interest of other departments. For example, the general principles of narcosis must be taught in pharmacology, but a large number of details regarding the effects of particular anesthetics may be left until anesthesiology is studied. Proper correlation eliminates unnecessary reduplication, averts the needless introduction of conflicting opinion and compels the deletion of inert and obsolete material. The opportunities for such divisions of labor are almost innumerable. Most pathologists will include examples of tissue changes induced by drugs; bacteriologists are well equipped to discuss phenol coefficients and many related topics in regard to antiseptics. The chemical aspects of toxicology may be relinquished to the biochemist; the vitamins to the physiologist and metabolist; many of the endocrine products to the endocrinologist, etc.

The resultant correlation has more important consequences than mere conservation of time. Knowledge is incomplete in many fields. Naturally, schools of thought have developed and frequently the different viewpoints warrant discussion. But there are innumerable, special and, for undergraduate purposes, minor differences of opinion whose omission avoids unnecessary confusion. Obviously, one should not create the impression that unsolved problems are solved; but it is equally apparent that the constant presentation of several conflicting viewpoints produces chaos in the mind of the student. There is scarcely a topic in pharmacology on which perfect unanimity prevails, and relatively few are so important that these differences of opinion require emphasis in undergraduate teaching.

Following the presentation of general pharmacology, it has been our custom to give lectures on a relatively small number of important drugs. A thorough analysis of a limited number, twenty-five, has proved to have greater value than a superficial knowledge of many. Another criterion, in addition to importance, is the readiness with which a given substance lends itself to exemplifying several other similarly acting compounds. If digitalis is discussed in detail, strophanthin demands only brief mention and most of the other members of the digitalis series may simply be named or omitted. This affords ample opportunity to discuss representative drugs having dominate actions on each of the anatomical systems. Substances with typical actions, which will not subsequently receive consideration in the laboratory, are included at this time. In general, the student investigation

of the chemotherapeutic specifics is pursued more satisfactorily in the laboratories of parasitology and bacteriology. Likewise, most student experiments involving heat regulation are quite unsatisfactory. In so far as time permits, examples from these and other groups of drugs can be included. The essential point, however, is that remarks be limited to essentials and designed for thoroughness.

The method suggested above presumably characterizes most courses of pharmacology, varying to some extent, perhaps, in the matter of emphasis. Reference should now be made to the student who is just as important in the program as is the instructor. The following suggestion will be considered reactionary by many who believe that students in professional schools ought to be permitted more or less complete academic freedom—that they should be allowed to study, when and how they please and abide by the consequences. One of the most common evil results is "cramming" before examinations and its usual effects. With this in mind, some instructors regularly assign selected reading, hoping that time and pressure in other courses will permit it to be done. A weekly half-hour written quiz still furnishes a much more efficient stimulus, minimizes procrastination, and succeeds in securing regular and serious attention for pharmacology. Considered in this light, pharmacology does not enter into competition for the student's time but insists on the performance of definite work at stated intervals. With the growing tendency in medical education to allow the student greater latitude, this insistence on some compulsory work may be regarded with distaste; unfortunately, there is no magic method of mastering pharmacology except by work some of which the student must do.

The students can be informed that these papers are not marked but are kept until the end of the course. If the quarterly and final examinations of a student are satisfactory, his quizzes are often discarded without inspection. If these examinations, particularly the first, are unsatisfactory, or other problems develop, these papers furnish considerable assistance in determining the status of a student at any time. Materials are available for the detection and early elimination of sources of difficulty involving teachers or students. This device also permits the lecturer to omit with safety many topics, such as definitions, minor drugs with topical effects or limited action and to organize and to elaborate on fundamentals. Since the student acquires familiarity with the individual drugs in his reading, the lectures are not mere repetition of the subject matter but organize, clarify and supplement it. Pharmacology can be made fascinating to students who understand it; but it is tedious, complicated and often permanently obscure to those who fall behind. If it is permissible to make a comparison, the lecturer begins somewhat in the manner of Clark, as suggested by Mode of Action of Drugs or his General Pharmacology, naturally with much less detail and covering a wider range of topics; when individual drugs are discussed, the lecturer proceeds somewhat in the manner of Poulsson, introducing more material from the domain of pathological physiology but restricting himself to the major aspects of important drugs and to making the mechanisms of their actions the basis of therapeutic applications. Naturally, the method of presentation, as well as the

emphasis, will vary; with nicotine, interest may be academic and even philosophic; with epinephrine, it is directed to physiology and therapeutics.

Perhaps, this distinction may be clarified by passing allusion to the universally admired, the late Professor Aldred Scott Warthin of the University of Michigan. It was his custom to interweave discussions of philosophy with matters of routine pathological interest. His remarks on philosophic questions probably created a more profound impression on his innumerable students than any other single undergraduate experience. Nevertheless, pathology, in its fundamental and eminently practical aspects was always emphasized. Like many others, I have never been able to determine which was more important in that formative period of student life.

Limitation of time prevents any discussion of the laboratory aspect of undergraduate pharmacology. However, this is unnecessary since the general programs suggested by Meyer-Gottlieb-Pick and Sollmann-Hanzlik have been adopted widely, with minor modifications. Fortunately, the pharmaceutical aspect of pharmacology is vanishing from the student's laboratory; experiments are undergoing increasing simplification; demonstrations are becoming more numerous, and the human subject is appearing as a test object. One minor suggestion may deserve mention. For a number of years, we have required every student to submit photographs of passport size. These are attached to the outside of a folder containing his weekly papers. After each period, it is possible for each instructor to record his impression of every student assisted, quizzed or otherwise contacted during the laboratory period. These dated and initialled impressions require but a few minutes to record and are invaluable in determining many attributes of the student in addition to mere scholarship. The impressions are secured when the student is under minimum stress and the formality of a quiz is absent. The photographs and initialled remarks are also extremely useful in the discussion of individual students at departmental meetings.

It will be noted that the method discussed in general terms here is not adapted to the "block system" of teaching which is in vogue in pharmacology. If pharmacology is extremely important in supplementing and clarifying several other preclinical subjects and furnishes an almost unrivalled opportunity to provide a liaison between the preclinical and clinical years, it is not clear why it has often been compelled to compress its teaching into a single semester. Since the functions just mentioned are, at least, as important as the knowledge of drug action itself, the subject is very susceptible to presentation at a slower tempo throughout the year. As a matter of fact, for several years, I have presented the parts discussed above, with the exception of laboratory work, during the first semester in didactic form. Then the student enters the laboratory with some background and a great deal more can be accomplished now than otherwise. For many years, lectures and laboratory work began at the same time at our institution; but it became increasingly apparent that little was accomplished in the early laboratory periods although simple experiments on the eye were introduced at first. Subsequently the students were divided into two sections and those who received

their laboratory work late in the semester did better than did those in the first group. It may be objected that a program of lectures and then lectures and laboratory prevents correlation between didactic and laboratory work. Actually, the presentation of drugs by anatomical system is greatly facilitated and comparisons of drug effects can be made much more readily when the student appreciates some of the major actions of the individual drugs. As a matter of fact, in the course we now give the laboratory work is completed in eight weeks since all of the class are taught at the same time. After two weeks of prescription writing, the remaining six weeks are devoted to so-called conferences with small groups. At this time there are no lectures or laboratory periods. In these conferences a typical therapeutic problem is introduced but considered pharmacologically. A patient with congestive heart failure is discussed from the standpoint of digitalis, the mercurial diuretics, the advent of pulmonary infarction, etc. The method employed is the informative quiz, the instructor analyzing, clarifying and supplementing the student therapeutic program.

Perhaps, the impression has been created that a course of pharmacology ought to possess the following features: preliminary grounding in general pharmacology; that is, the presentation of physiological principles as applied to pharmacology; this should be followed by lectures on a limited number of important drugs. After one semester, correlated lectures and laboratory follow. When the essential subject matter has been presented and prescription writing briefly discussed, some informative therapeutic quizzes are introduced. During most of this time the student performs and is examined on regularly assigned work. A course of this type fills a definite need and follows the conventional outline. But it fails to accomplish much more than the mere exposure to many facts and an opportunity to absorb them.

The essential feature, the difference between success and failure, resides simply in the matter of emphasis, which is difficult to define.

The mere accumulation of facts, especially if the data are unassorted and poorly understood, does not constitute good educational procedure. Moreover, it is not desirable to make pharmacology simply a handmaiden of practical therapeutics. But, by proper direction of emphasis, pharmacology can assist in making the student realize that the body is a complex, integrated organism whose many functions are intimately coordinated and interrelated. Such a course must be broad in scope but not encyclopediac, demand exact information but not details, have greater concern for a general appreciation of the problems involved than for individual and isolated facts, and give consideration to the acquisition of habits of thinking, observation and study rather than the ability to reproduce unassimilated information. To open the way to wider interests by using pharmacology as a vehicle rather than for its own sake characterizes the direction of this emphasis.

DISCUSSION

On Papers of Drs. Myers, Lamson, Boyd and Smith

DR. FREDERICK F. YONKMAN (Wayne University): The papers of Dr. Lamson and Dr. Boyd are not only interesting but very timely. Many papers have been read before this group and elsewhere on the subject of pharmacology and what to do about it, as though it were a wayward child or a reprobate to be despised. The best solution seems to be found in Alan Gregg's article, "Addenda to the Agenda for the decade of 1940-1950," which appeared in the *Journal of the American Medical Association* of March 30, 1940. Gregg aptly states, "It (pharmacology) should be separate and in its own right articulated with physiology and biochemistry, not ankylosed or encysted. Though financial support for pharmacology is important, reflection, discussion and clearly defined reorganization are essential; that is the dean's job and the faculty's responsibility." Instead of combining it with physiology or physiological chemistry, which generally means submergence of one or the other, and usually it is pharmacology which suffers, it should receive its proper consideration. This cannot be done by relegation to improper quarters such as garrets and cubby holes under stairways nor by improper sequence and insufficient quota of hours in the curriculum. Even the most venturesome, ambitious and aspiring teacher of pharmacology is subject to the depressing effects of such meager recognition and provision. And not only he but his subject and his students suffer proportionately.

To warrant proper recognition, teachers of pharmacology must have something to offer. That something is the finished product, the student, regardless of the popularity of the course or its instruction staff. If the student has gained a sound, fundamental basis for rational therapeutics, his preceptors in pharmacology deserve genuine support by the administration. Intelligent neglect may well be proper treatment for some patients, but the distressed must still be comforted, which usually implies rather early, judicious medication of some type, regardless of the fact that surgery may be eventually, if not immediately, indicated. And rare, even, is the surgeon who would be so bold as to decry the use of proper medication when he so needs it for preparing, anesthetizing and properly caring, postoperatively, for his patient. This concerns pharmacology. This subject is, with all due respect to pathology, a very real liaison between the preclinical and clinical periods of training. As teachers of pharmacology we have the challenging opportunity to carry over in applied form that which the student of medicine has learned to date, and we should make every attempt to assist him in gaining a broad, fundamental basis for rational therapy. This can best be done by making our teaching intensely practical, as well as very fundamental. The application and evaluation of facts learned must be constantly stressed.

Dr. Lamson's novel suggestion of doing away with the term pharmacology and replacing it with the term biotropy may seem unnecessary or inexpedient to some, but it deserves serious consideration, since, as he states, we may think that we are teaching drugs and their actions but we are really stressing the reaction of body tissues or systems to chemical agents or drugs. We speak of anthelmintics, hypnotics, anesthetics, cholinergic and adrenergic drugs. We are biotropeists when we study the response of the hypertensive patient to various vasodilating agents even though we seek drugs which will modify certain functional processes by alteration of the response elicited in the tissues affected. Emphasis can well be placed upon the cellular, tissue or organ response to a drug, since most of our modern authors of textbooks on pharmacology now utilize, at least in part, the classification or grouping of drugs affecting the central nervous system, the peripheral nervous system, the digestive and respiratory systems, and so on.

However, as desirable as Dr. Lamson's term of Biotropy may be, limitations as to its facile usage prevail, perhaps not so much in teaching the science to beginning students but in presenting the numerous desirable and undesirable actions of new drugs for use by the physician. If he employs the little compend known as *Useful Drugs, New and*

Non-official Remedies, current literature or staff conferences as his immediate source of information, new drugs will still have to be described as they now appear in the literature. The chief responses elicited by the drug will be briefly listed in sequence along with chemical, physical and therapeutic incompatibilities and with proper attention devoted to toxic manifestations invoked. Obviously, most physicians will not scan numerous pages, seeking all pertinent information of a new drug under the numerous classified systems and parts of systems affected, and then looking still in other sections for a description of toxic, chemical and physical properties of, let us say, an antispasmodic. To be sure he should seek first under either Genito-urinary Tract or Digestive System in the Biotrepist's Classification, but caution demands that he know all reactions elicited by the new drug. This search would be too cumbersome for the busy practitioner. He must resort to brief, clear, succinct descriptions which amount to a compilation as one might gain, if persistent, from a Biotrepist's Classification. It seems that we can still be Biotrepically minded without completely discarding present conveniences such as modern textbooks of pharmacology, *Useful Drugs*, *New and Non-official Remedies* and Council reports of new drugs. I should like to ask Dr. Lamson how he would present new drugs to the profession.

As to movies in pharmacology: Excellent, if not too numerous. The greatest difficulty would be to decide on who should give the more important lectures. Further, if movies in pharmacology, why not in all classes? The student might be "mowed" to death. And the personal element, the professor's spontaneous witticisms, unhampered by stage fright or mike shock, must not be discarded. "The image is beautiful but to touch it is heavenly." That still holds in teaching. We need more personality in our teaching, not more personalities.

Dr. Boyd has made several interesting suggestions, and some of his remarks warrant emphasis. I like his statement regarding the specific function of pharmacology as that of establishing a firm basis for sound therapeutics. His disparagement of verbose, unimportant detailed description of chemical and physical properties of every useful drug is pertinent. The average medical student, who may still become a good physician, has two strikes on him before he picks up the "pharmacologic bat" to take his "cut." The third strike is soon added by way of lack of interest in the subject if he is floored with such material as Dr. Boyd referred to in connection with one author's description of chemical relatives of Quinine and Ruban. Material must not only be pertinent but useful and interesting. And above all, it must be interestingly presented, regardless of the technique employed, by use of lectures, demonstrations, movies, laboratory exercises, student presentation of well-written current articles and, last but not least, of humor, not on rare, but on frequent occasions. If we enjoy our subject and live it, that subject becomes contagious. It catches on. That's a challenge. And what is a course but dull drudgery if the instructor fails to capitalize by giving of his philosophy and his experience? That too is challenging.

Dr. Boyd mentions the half-hour weekly examination. One or two questions for five or ten minutes serves the same purpose, I believe. The chief justification for any examination is the attending review; grading is incidental, but necessary. Our staff in pharmacology believe in many examinations, written, oral, and practical. In four months our students in pharmacology receive six or seven major one to two hour examinations and numerous short quizzes. And still our better students, as well as the less agile, ask for more. Examinations too, can be interesting as well as informative. And as for the drop, unannounced quiz, I despise it! It has no place in medical education. The sooner it is outlawed the better. I should like to ask Dr. Boyd if the honor system is used in his classes during examinations.

It seems desirable that there should be some carry-over of pharmacology into the third year. We are very fortunate, as are most colleges, in having a clinical staff of very fundamentally and pharmacologically-minded teachers. It makes our task not only

more worth while, but also more enjoyable. Further, we have an opportunity to continue and expand the student's training in the course in therapeutics conducted by the department in the third year. This, I believe, is a necessary sequel to basic pharmacology, allowing for reemphasis of the practical application of fundamental principles of drug actions, or as Dr. Lamson would have it—of tissue reactions to drugs.

I think that Dr. Lamson and Dr. Boyd have earned our gratitude for their thought-provoking presentations.

DR. E. S. RYERSON (University of Toronto): I was delighted to hear Dr. Lamson approach the subject of pharmacology from a different point of view. I am going to have the courage to do the same with regard to the subject of anatomy.

It may seem like heresy to do so, but I think I can convince you that there is some justification for the possibility of looking at a knowledge of the structure and function of the body from a different point of view. We have always approached it as a mechanical structure, something of an architectural nature which has been built up, an approach which is perfectly sound and perfectly just, some of the beautiful architectural arrangements in the body being amazing.

But if you look at the body from another point of view, that of a living organism, you will approach it in an entirely different way. You go back to the fundamental and the simplest form of living organism, the single, unicellular organism, and study its life characteristics.

I cannot explain that better to you than by describing the moving picture film of Professor Robert Chambers of New York University on the cells. Some of you may have had the privilege of seeing his moving pictures. If you haven't and you ever get an opportunity, don't miss them. The picture begins by showing a single-celled organism in its media, demonstrating its life activities. The cell moves. Movement is one of the characteristics. You see it changing shape and form, and moving about in the media on the screen. It looks about the size of a saucer, moving over the screen in various positions. If it is put under high magnification, movement can also be seen in the cell itself. The granules and mitochondria are floating and moving and jumping about, and the same in the nucleus. Movement is demonstrated in the cell and in the organism as a whole.

As you watch the cell moving across the media, it seems to come in contact with something which is nutritious and immediately takes it in with its pseudopodia. The substance is broken down, taken into its various structures, and the excess thrown off, exhibiting the characteristic of metabolism in the living structure.

As it moves about, it seems to come in relationship to certain things in which, instead of moving toward them it shies away over to the side and gets away from them. The fact that it moved toward certain things and away from certain things shows there is some inherent power of response to stimuli. It has a certain sensitivity which is the fundamental foundation of the whole nervous and mental psychological system of which such a complex organism as the human body is made up.

Then you see the cell as it stands there. Suddenly the nucleus begins great agitation, divides, and the two cells divide, and here are two cells. Each of these cells then begins the other characteristic of life, that of birth, growth and development to maturity, and death, death being an evidence of life.

These characteristics may vary according to the environment of the cell, and they may vary according to the heredity of the cell. In that way, you begin with the single cell as an example of how we can approach the human body.

When we come to look at the human body as a living organism, it is composed of an incalculable number of individual living cells. Each one of them has the same characteristics as a single cell organism, and if we look into how that cell maintains these life

activities, we find that it does so as a result of the blood which comes to it, which brings to it not only its oxygen but its nutrition elements, and it does so through that part of the circulation of blood which we speak of as the capillary, which, under ordinary instruction at the present day and in most textbooks, is dealt with in a most cursory fashion. A half page or a page to the general description of the structure of a capillary is given, and very often in describing the different parts of the body it appears in small print at the end of each of the sections.

Now, the structure of a capillary from a cellular standpoint is extraordinarily simple, a single layer of endothelial cells which lines the tube of the capillary, in addition to which there are the Rouget cells, which are responsible for the contraction or dilation of the capillary.

I had the greatest thrill that I can remember for a long while, particularly thinking of things from this living point of view, in running across Krogh's "Anatomy and Physiology of the Capillaries." And of you who have not looked at and read it will have your eyes opened. In discussing the distribution of the capillaries, he describes the number of capillaries in a square millimeter of muscle; he actually counts a great series of these and finds the number in a square millimeter of human muscle in which there are two hundred muscle cells, two thousand capillaries. If that doesn't give you a different idea of what a living muscle is than we ordinarily get by histological study under the microscope, I am surprised. He makes it rather interesting by adding the mathematical side to it, because he says, if you put together end to end the capillaries in the muscles of a man 150 pounds in weight, the total length of the capillaries, would go two and a half times around the world, and that is our capillary system in muscles alone.

There are a million glomeruli in the kidneys, and the capillaries in each of those would reach fifteen miles or twenty-five kilometers.

All of the cells of the body, as a result of this capillary system, are constantly undergoing change. Similarly if we look at the blood. The blood is composed of its plasma and cells. If you ask a student the number of red cells, he tells you five million per cubic millimeter. If you ask a person, "What is the population of the United States?" and he replies, "There are one hundred or two hundred or some other number per square mile." This is not what you want to know so you immediately ask him, "what is the total population?" and he tells you 130,000,000 i. e., the number in the whole unit. "What is the total red cell count in the human body?" It is a mathematical calculation and amounts to 30 million million. It is the same way with the white blood cells, the leukocytes. The student will tell you the normal count is six to eight thousand per cubic millimeter. You ask the total, and he has not any idea.

I used this as an example in teaching on two cases recently. One had a leukocytosis of 28,000. Instead of having a total count of 50,000,000,000 he has four times that or 200,000,000,000 cells, as a protective mechanism of some size for his body as a whole. We haven't looked at the body as a whole, and therefore we haven't taught students from this particular point of view.

In the teaching of anatomy, if we were to begin with a study of a capillary, about the simplest unit of structure in the body, follow in the direction of the blood flow, and teach next the structure of the vein (in which only a small addition of a muscular coat is made to that of a capillary), as well as the presence of valves and the part they play in the circulation; and then give instruction on the first organ reached, namely the heart. The heart is recognized as the center of life, so it seems logical to initiate the study of the living body from this organ, describing its structure and the relationship of this to its function. As well, follow the blood through it, the next organ it comes into is the lung, so that the students gain a knowledge of the structure of this and changes that occur in the blood during its passage through it. The direction of the blood flow is

followed and the structure and functions of the trunk, the extremities, the abdominal viscera and the nervous system are taught in this order, bringing out the part that the distribution of the blood vessels, more especially the capillaries, play in maintaining the quality of the structures and the performance of their functions.

Corresponding with this order in anatomy, the Department of Physiology carries on instruction concurrently in the blood and its circulation, in respiration and so on with other parts of the body, the two departments correlating their instruction with one another as it progresses. The effects that movement and physical activity of the body have upon circulation and respiration are brought out as very few of us really appreciate their significance from a physiological standpoint.

The normal blood cycle is completed in a little over two minutes at rest. In active exercises that increases to between twenty and thirty seconds, some six times as fast or more, than in the ordinary conditions, and if the blood is conveyed to the different tissues of the body six times as often, it is obvious that the quality of those structures will be improved by that repeated carrying to them of fresh blood.

I find the greatest difficulty in getting students to appreciate the fact that bone is a living structure. If you think of bone from the standpoint of its being the place where red blood cells are formed and realize that, with an increased rapidity of the circulation through the red marrow resulting from physical activity, those scientifically interested have found that an increase of red blood cells actually occurs, so that the number per cu. mm. becomes 6,000,000 instead of the normal 5,000,000, which means that the increase in the total blood amounts to 6 million million, an enormous gain. When the student realizes that he appreciates that bone is a living structure and not merely a piece of solid dead material.

The same idea is followed in discussing how the blood provides for the nutrition of the body, by studying the securing of the nutritious materials from the digestive organs, the carrying of it to the cells of the body through the circulation, and the getting rid of the waste through the excretory organs.

Then the nervous system, the controlling mechanism for all the activities of the body, is covered from the neurological standpoint, both structural and functional aspects being taught concurrently.

The course is completed by the study of the individual as a whole in relationship to the quality of all of his structures and the efficiency with which they perform their functions, because we know that the function of a structure is definitely influenced by the quality of the structure. Not only that, but the converse, viz, the performance of function is essential to the maintenance of the quality of the structure. On these principles the background of this course is founded.

I began the suggestion of this idea with reference to health some three years ago in San Francisco, and everybody was little interested in it. Many didn't see the point of view at all. If we had to wait for the introduction of this idea in medical curricula and to get all the anatomists to change the background of their courses and all the doctors to change the background that they have had for so many years, we would probably have to wait, from my experience with medical education and reforms that occur, some twenty-five to fifty years.

Fortunately, an opportunity arose for the application of the teaching of anatomy and physiology and the structure and functions of the body in another direction altogether at our own university. I was called to a meeting of a committee that was appointed to devise a course in physical education for men in the university. The consideration of this arose as the result of the demand of the secondary school system for teachers not only to teach physical education but to teach health education. Well, I jumped, when I saw this opportunity to further my idea. It is surprising how medical men do not realize the advances that have taken place in general education with regard to health.

The first objective of general education in this country, in Canada, and in Great Britain is health education, and still we have yet to undertake the training of people to teach health education. We train men in chemistry and physics to teach the sciences. Mathematicians graduate from the university to teach mathematics. With history and literature it is the same way; languages, the same way. But there has been no conscious attempt in universities to train teachers to become specialists in teaching health education.

I have succeeded in convincing our Senate to introduce such a course, and such a course has begun at the University of Toronto, with its first year, and it will lead to a degree of Bachelor in Physical and Health Education. After that, if the graduate desires to go into the teaching profession, he can do so. But he needn't do so. I, personally, think that it would be a very interesting education for a lot of people, even if they didn't want to go into teaching, to have a background of this kind. I think they could live better lives as a result of it, as I hope the teachers who are educated in this course will do in the schools, because I think one of the greatest difficulties we have at the present time is the ignorance of the public with regard to the health of the body and diseased conditions.

I deplore most sincerely the amount of publicity with regard to disease, as a means of overcoming our problem. The difficulty at present is the patient makes his own diagnosis, when it is the most difficult diagnosis in the early stages of the disease. The difficulty is in getting the patient to the doctor when he should go to a doctor. If he hasn't any background of knowledge of how the body is made and how it works, he is subject to all kinds of propaganda over the radio, advertisements, and so on.

I hope, as a result of the experience with this course in which our departments of anatomy and physiology and psychology and biochemistry have agreed to teach anatomy and physiology from this different standpoint, that at some future date I may be able to make a further contribution with regard to the development of this idea.

DR. LINN J. BOYD (New York Medical College): In reply to Dr. Yonkman's question concerning the method of conducting examinations our procedure briefly is as follows: In term examinations we employ a system whereby the student remains unknown until the paper is graded. The examinations are conducted under the honor system. In the front of the room there is a small table on which are the examination questions, examination papers and small cards. Each of these cards contain a number. The student places his number upon the paper and puts the card in his pocket. After the papers are marked the student brings in his card and identifies his paper. If he sees his grade, if he wishes to know what it is, only then have we identified the paper.

I have no objection to the use of structural formulas in teaching pharmacology. In fact, it might prove very successful in the hands of certain individuals who are dealing with students with more than average knowledge. What I was trying to say was that the over-emphasis upon synthetic organic chemistry to the exclusion of other matters which more nearly are on the level of knowledge students require does not seem advisable.

Further in regard to Dr. Yonkman's remarks, I think that examinations are a very serious matter. They should not merely serve to determine what a student knows. We have very definite responsibilities to students and we ought not to discover on the last day of the course, for the first time, what his status is. With our system, we can chart a student's progress. Moreover, at times we present subjects in a manner which we think is very lucid, but for some reason or other it serves only to confuse. Quizzes and examinations are as important to the instructor as to the student.

Examinations ought not to require very much writing. The questions must be framed for different purposes. Some are designed to discover specific information, others to determine ability to think, others to correlate information, etc. They should provide information about other attributes than mere scholarship. If students are judged purely

on bases of scholarship, by which I mean their ability to reproduce information to which they have been exposed, we are falling far short of our purpose.

There is another thing often not fully appreciated. Students come to medicine with excellent training. They have been instructed by individuals devoting their life exclusively to teaching and well informed in matters of pedagogy. The instructors are usually not selected for outstanding research ability or surgical technique, but on the basis of that the function of a teacher is to teach. It is my conviction that if more attention was devoted to pedagogy, organization and stimulation, perhaps we might be a little more successful.

DR. PAUL LAMSON: Dr. Yonkman asks how new drugs would be presented to the medical profession if my plan of chemobiotrepy should go into effect. From a practical point of view there would be no change from the present. A new drug would be given a chemical name, a trade name, or would be named by the American Medical Association. Literature about this new substance could be found under the chemical name of the drug in any good index, as *Chemical Abstracts* or the *Quarterly Cumulative Index Medicus*. Its standing among accepted drugs would be indicated by its presence in the *U. S. Pharmacopoeia*, *New and Nonofficial Remedies*, or under "Council on Pharmacy and Chemistry" in the *Journal of the American Medical Association*. But this is all from the point of view of the chemist, pharmacist, or pharmacologist. The interest is in one particular drug.

What I have been emphasizing is the need for the reverse of this, an index in which under a disease, an organism, a tissue, or a function of the body, one could find a list of drugs which affected one of these factors. Some three thousand sulfonamides have been made and tried on many different kinds of bacteria, but can you turn to some particular type of organism in which you are interested and find a list of references to all the sulfonamides which affect or show no action on that particular type in which you are interested? Much money is being wasted for lack of a good recording system, but the establishment of a workable system is an extremely complex affair. My idea of considering the organism as a community of cells of different types which could be classified and arranged in an orderly manner might serve as a starting point for such a plan.

Dr. Boyd spoke of the danger of discouraging the student by too much emphasis on the chemical structure of drugs. It is only too true that there is danger in this direction, but how are we to name new drugs? The word *horse* means something to us. The word *ortho-acetoxybenzoic acid* gives the chemist a specific mental picture of a drug, but it is apt to give a clinician nothing but a headache. Yet if we go by trade names, which may mean merely a drug "that my friend Jones uses," we may go wrong as was the case with the nationally known internist who wrote a prescription for half Aspirin and half Empirin, both of which are nothing but ortho-acetoxybenzoic acid, which again is designated as Acetylsalicylic Acid in the U. S. P. The only moral to which, is that we are living in a complex world and we had better face this fact and act accordingly.

Examinations in Pharmacology

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It is quite generally recognized that the medical colleges of this country have done as much to set their houses in order by the institution of progressive teaching methods as has any other group in contemporary education. These advances are the direct result of the influence exerted by the representative and enterprising groups comprising the membership of the Association of American Medical Colleges. It is the hope of everyone who is in any way associated with progressive medical education that corresponding and substantial gains may be anticipated in the future.

Among the many advances in medical education are new methods for evaluating one's work and new methods for the presentation of material. How best to evaluate a student's work to warrant his promotion to advanced standing has long been a moot question. There are those who believe that a written examination over a series of lectures suffices as a criterion. Others think that a short oral examination of from 15 to 20 minutes is sufficient basis for evaluating a student's achievement even in such a major course as pharmacology. And still others believe that only by completing some project or some form of practical examination is the student able to demonstrate adequately that he warrants promotion. Some relative arguments have been well presented by Karsner in his paper "Philosophical Comments on Examinations¹," and, no doubt, these arguments will continue to be of interest as variable teachers gain varied experience with the variable factor, the student.

In the field of pharmacology, as in other fields of medicine, the teacher is fortunate in having a considerable amount of new material to present at frequent intervals. Especially is this true now, since more specific chemotherapy has properly come into its own. With less empirical treatment there has been less need for intensive training in materia medica and pharmacy, important as some fundamental features of these may be. There has been more emphasis on the dynamic properties of preparations and their constituents and the reaction of tissues to these substances, thus affording opportunity for demonstration of, or for participation in, experimental procedure by staff and student respectively. This has been and is today an interest sustaining feature in the modern teaching of pharmacology.

I am not one who subscribes to the notion held by some that a final written examination on a set of didactic lectures is the best means of evaluating one's capabilities in a certain curricular segment. Neither do I subscribe to the conviction of some educators that the more perfect the demonstration of certain

1. Karsner, Howard T.: *Philosophical Comments on Examinations*, J.A.M.A., 108:1022-1026, (March 27), 1937.

fundamental physiological reactions, as conducted by staff members, the less the student receives from the demonstration. And more emphatically still, I do not believe that any student of medicine does his best when placed entirely on his own responsibility without any formal guidance whatever, either by way of lectures or demonstration in such a course as pharmacology. The modern medical curriculum is too infused with important detail, let alone basic and fundamental concepts and principles, and the time is too limited, to allow floundering and wastage of time because of inadequate guidance, if not inspiration, by properly qualified instructors.

The first requisite of a teacher is to be able to inspire his students. The "Mark Hopkins and student on a log" type of teaching is still possible despite moderately large classes. If one can lead the student to the fountainheads of knowledge and also make him drink thereof, he is a teacher. This, obviously, is accomplished by diverse technics and devices; the chief factor should be that which sustains interest. Inspiration leads to interest and interest leads to acquisition, whether it be in terms of happiness, worldly goods, or factual knowledge. Our entire philosophy of teaching pharmacology at Wayne University, has always been to sustain interest.

Lectures, demonstrations by the staff², many varied and readily conducted experiments by students, as well as assignments in current literature, comprise the material content of the course. Everything is taught with continual emphasis not only on the fundamental principles involved but also on the practical application of material presented. With this practical emphasis, we know, there will be variance of opinion among educators, but we believe that this emphasis is justified. Our students are making a tremendous investment with the legitimate hope that they will be able to earn an honest living. They will soon be faced with a cold world which deals in stern realities, and they must be properly equipped in practical as well as fundamental scientific concepts. To this end the fundamental concepts are "tainted" with practicality in our teaching.

A very important feature of our presentation of material and of our method of evaluating achievement and capacity for achievement is that of the practical examination. We believe with Karsner that any examinations given during the course have a twofold purpose: namely, to assist in evaluation of a student's attainments but also to serve as an instructional medium—to be more specific, to develop and assist the student's capacity to correlate. The practical examination is not new, to be sure. Many teachers have long employed this form of examination in their pedagogy. It is the type of practical examination which determines its value. My former preceptor, the late Dr. Oscar H. Plant, of the University of Iowa, employed the type of examination so familiar in qualitative chemical analyses. Dr. Mendenhall, my former chief at Boston University, used the same type of examination but with the interesting addition of presenting the student, in story form, with a few leading facts and clues as to the probability of what might be contained in an unknown to be examined. Others undoubtedly have

2. Doctors A. J. Lehman, H. F. Chase and C. C. Pfeiffer.

employed this technic to advantage, but general knowledge concerning it does not seem to prevail, since many educators express genuine interest in verbal description of the type of final practical examinations being conducted in pharmacology at Wayne University.

Briefly, our students work in pairs, but during examinations they work alone, which necessitates repeating the examination. This is done easily, however, and since adequate facilities preclude intermingling of the two groups between examinations, all students deal with the same problems. Thirty problems, each to be solved within a 3 minute period, are so designed that they can be dealt with properly in this limited period. The time element means working under a certain amount of stress, being keyed up and alert throughout the two hour period and approximating mildly certain conditions to be encountered professionally.

A few representative problems follow:

On the desk top is a 4 inch by 6 inch card showing a diagram of three "stippled" red corpuscles. A microscope, with a sample of stippled blood cells, is also set up for inspection. The card contains this notice:

"This drawing illustrates part of the blood picture found in a certain type of chronic poisoning in man. Name the responsible agent. List additional significant blood changes and important clinical features."

Readily the answer comes to one—chronic lead poisoning, with stippled red cells, secondary anemia and reduced hemoglobin, with the clinical features of lead line of the gums, abdominal cramps, constipation and, perhaps, wrist drop and lead encephalopathy. Had the student been asked to state some U.S.P. or N.F. preparations of lead, he could have enumerated several. Or, had he been asked to state a therapeutic use of lead, he would have readily mentioned its use as a local astringent in ivy poisoning. He has seen red cell stippling, has heard of it; he has precipitated egg albumin with lead acetate solution and knows the value of this feature in the treatment of burns and ivy poisoning. He has heard of and has seen slides of wrist drop as a sign of chronic lead poisoning. In other words, all he has learned about lead is suddenly called to mind by the cardinal and practical finding of lead stippling of red cells—something tangible which we demonstrate by inserting lead shot into a rooster's crop and then having various blood studies periodically carried out and reported by a student of the class who has been assigned this problem as part of his class project. This type of training, we believe and know, makes our students conscious of and alert to the possibilities and potentialities of some chronic form of poisoning taking its toll quite insidiously in those patients often seen in the clinics with vague, rather indefinite, borderline symptomatology.

Here is another problem. On the desk top are two very much depressed frogs with exposed sciatic nerves. The card statement follows:

"One of these frogs has received magnesium sulphate and the other has been given either curare or erythrina. Which is the curarized frog?"

An electric stimulating unit with electrodes is on the table as are also some essential tools. Within twenty seconds, the student can differentiate the frogs if he recalls the central action of the magnesium ion and the peripheral action of curare which, as is well known, insulates against conduction from nerve to skeletal muscle. This curare paralysis is not only readily demonstrated by failure of response to electrical stimulation of the sciatic nerve but becomes a fact of direct clinical value in view of Bennett's interesting work at Omaha in the prevention of fractures and tendon avulsions in the "metrazol shock treatment" of schizophrenic and other psychiatric patients, concerning which the student has heard in his didactic lectures in pharmacology.

A problem dealing with visceral, unstriated muscle follows:

"This is a tracing of the response of an atropinized guinea pig uterine strip to a well known smooth muscle stimulant.



1. What drug might have been added at B?
2. Briefly state the clinical significance of the action illustrated here."

The student knows that the more important uterine stimulants worthy of consideration are solution of posterior pituitary, epinephrine and quinine on occasion, and ergot. He has been considerably impressed with pituitrin as regards its locus of action, its tetanic nature and duration of contraction and the hazards associated with its use in obstetrics, the latter from such conservative articles and discussions as appeared in a recent issue of *The Journal of the American Medical Association*.³

A problem involving drug action in the eye is pertinent. The desk card states,

"The diagrams represent three pupils, No. 2 being a pupil of normal size. Pupils Nos. 1 and 3 are under drug influence. With the aid of the characteristics listed under the respective pupils, name the drug producing pupil No. 1.....
and No. 3....."

1	2	3
Light reflex present Wink reflex absent	Normal	Reacts to epinephrine"

3. Sharkey, John A.: Should Solution of Posterior Pituitary Be Used in the First and Second Stages of Labor, *J.A.M.A.*, 115:1315-1317, (Oct. 19), 1940.
Pendleton, George F.: Abuse of Solution of Posterior Pituitary During Early Labor, *Ibid.*, 1318-1320.
DeLee, Joseph B.: The Use of Solution of Posterior Pituitary in Modern Obstetrics, *Ibid.*, 1320-1326.

Knowing the seat of action of the more frequently employed miotics and mydriatics, the student correctly answers cocaine for No. 1 and pilocarpine, physostigmine or morphine for pupil No. 3 on the basis of having performed similar experiments on his partner's eyes and on rabbit eyes in the course of laboratory experimentation.

These are only a few of the thirty problems given in last year's final practical examination. A complete list of the questions and answers with necessary equipment is available to anyone interested. The examples cited here illustrate the fundamental as well as the practical nature of pharmacologic material studied.

At midterm, we employ the Mendenhall "story type" of practical examination. Clues are presented in a brief case history form and the student after gaining proper suggestions from the history approaches the solution of the problem. An illustrative problem follows:

"'Candy' thought the four-year-old youngster as she eyed the chocolate-coated A.B.S. pills which inadvertently had been left within the child's reach by thoughtless parents. Shortly after she had taken freely of the 'candy,' the child's mother was fortunate to arrive on the scene just when serious signs of hyperexcitability became evident. The physician who was hastily summoned arrived just prior to the first convulsive seizure, which he almost forestalled by giving a few inhalations of chloroform and then injecting intravenously some of the solution in vial F. The convulsions were diminished and soon completely checked. Eventually, complete recovery ensued. What substance studied in your laboratory caused the convulsions and by means of what drug (in solution) was the child restored?"

Careful reading of the problem reveals that:

1. A.B.S. pills, containing aloin, belladonna and strychnine, if chocolate coated, might well be mistaken for candy, hence imbibed.⁴

2. If imbibed, strychnine could have been responsible for hyperexcitability or convulsions (These features have been demonstrated by student and staff in the laboratory).

3. The logical treatment demanded a depressant to antagonize the stimulating effect of strychnine.

4. The best treatment for this case, the student has learned,⁵ is the intravenous administration of some soluble barbiturate which can be detected by reagents which are found with the barbiturate (vial F) and test tubes on the desk. Other depressants such as chloroform, ether, chloral hydrate, paraldehyde, bromides, sulphonals, and opiates are also on the desk. By proper reasoning as to limitations of these agents when intravenously administered and by proper observation of testing reagents available, the student decides that a soluble barbiturate is appropriate in this case and tests for it by a hasty qualitative color reaction in solution.

This type of question, of which three are given during the two-hour examina-

4. Aikman, John: The Problem of Accidental Poisoning in Childhood, *J.A.M.A.* 103:640-642, (Sept. 1), 1934.

5. Kempf, G. F.; McCallum, J. T. C., and Zerfas, L. G.: A Successful Treatment of Strychnine Poisoning. Report of Eleven Cases, *J.A.M.A.*, 100:548-551, (Feb. 25), 1933.

tion, not only tests memory but allows for correlation and observation. The student is allowed to use any material he chooses, textbook, notebook, color charts, or "useful Drugs."

The final correct solution is not necessary in this practical examination. Emphasis is placed on reasoning and correlation. All steps, tests, and reasons for procedures performed are recorded by the student, and if he has demonstrated by proper deductions an intelligent approach to the solution of his problem, he receives almost the same credit as if the solution had been correct in every detail. This type of examination has regard for the slower student who believes that the speedier final examination of thirty, 3 minute questions does not allow him to demonstrate adequately his achievements because of the time element.

The practical examinations, both slow and rapid, have been not only valuable but popular. Even those students who do not achieve the highest honors express their genuine interest in them and freely state their belief in the fairness of this type of examination when sustained by oral and written comprehensive examinations.

It is quite evident, then, that one can be basically fundamental and still be practical. Since our students seek practical and useful knowledge, our presentation must be such that it is not only interesting, inspiring and scientifically accurate but the material must be useful. The technic of presentation described above, with the help of the practical examinations, has led to such gratifying results by way of preparing our students for both national and state boards examinations that it will be in continued usage until replaced by better methods of presentation of material not only, but also of evaluating one's achievements or capacity for same. Examinations and examinations, oral, written and practical, not only allow each student who is accustomed to one type of examination to adjust himself to other types, but many examinations, regardless of type, are justified by the attending review. Frequent, arduous rehearsals not only produce Fritz Kreislers and Paderewskis but Oslers and Cushings as well.

Thus we believe firmly in frequent examinations and conferences over fundamental and practical material which has been interestingly presented with the hope of inspiring students of medicine to be forever pharmacologically and therapeutically minded and not pharmacologists. Any honest means to gain this end is justifiable and to reach this ultimate goal is a real challenge to us as teachers.

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*Entrance Credentials
of 1940 Freshman Class*

The seventy-seven medical schools of the United States reported having enrolled 5,819 freshmen for the 1940-1941 academic year, 52 less than in 1939. As is always the case, some of these students may have withdrawn for various reasons. The outlook for a graduating class of 5,000 in 1944 is not good. Educational studies made by the Association of American Medical Colleges over a long period of years have shown that at least 20 per cent of every entering class fails to graduate; the percentage has been as high as 25. In the face of the present emergency these figures are disconcerting.

So far as length of preparation for the study is concerned, analysis of the years spent in college by the present freshmen shows that only 1.6 per cent had less than three years of college work (92 students). Only nine medical colleges accepted these students, the highest number accepted by any one college being 18 students.

Only 35.6 per cent of all freshmen did not hold a bachelor's degree, or better; 64.4 per cent held a degree—A.B., or better, 37.5 per cent; B.S., or better, 26.9 per cent. Multiple degrees were held by 165 students—22 of these have the Ph.D. degree; 109 students have the master's degree. From three to less than four years' credits were offered by 27.5 per cent of the students; 6.5 per cent had four or more years of college work.

These figures show that there is an increasing tendency on the part of prospective medical students to remain in college longer either for the attainment of a better general education or with the hope of increasing the chances of accept-

ance by a medical school. Whatever may be the reason for lengthening the stay in college, the student must have profited from it. It is a hopeful sign. If the efforts now being made by this Association, the college and other interested organizations to liberalize the courses taken by these students, stressing the need for a better general education rather than a narrowing down to purely scientific subjects, although it must be recognized that they, too, have much educational value, the quality of these students, scholastically and in preparation for medicine, will be improved to a considerable degree.

The demands made on the physician today call for a broad cultural education. He must be not only well educated in his purely professional duties but he must be prepared to recognize and consider well many other factors which bear heavily on disease, its prevention as well as its cure. His character, resourcefulness and judgment must be of the highest quality if he is to be a truly successful practitioner. Culture and intellectuality are essential requirements for the physician.

On the whole, the outlook for attaining better ends is good.

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Selective Service

According to the information received from the medical schools of the United States, 20 per cent of freshmen and senior medical students, 24 per cent of sophomores and 23 per cent of juniors have received questionnaires and have been classified, the majority being subject to call for one year of service in the armed services of the United States.

If called, the civilian population is in danger of facing a shortage of physicians

and, therefore, adequate medical care. This matter has been presented to the authorities by the Committee on Preparedness of the Association of American Medical Colleges of which Dr. Willard C. Rappleye, dean of Columbia University College of Physicians and Surgeons, is chairman. It should receive serious consideration by the Washington authorities.

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Graduates of 1940

An analysis of the length of study in medical college of the 1940 graduates shows that 85.8 per cent entered college in 1936, completing the prescribed course of study in four calendar years. Twenty-five entered college in 1937, completing the course in three calendar years. Six hundred and eighty-five (685) graduates began the study of medicine prior to 1936:—489 in 1935; 117 in 1934; 50 in 1933; 20 in 1932; 3 in 1931; 5 in 1930 and 1 in 1926.

The majority of this group were repeaters. Some of them had dropped out for reasons other than failing or poor scholarship, for instance, financial reverses. These often attend college one year, drop out for a year or two, returning when they are able to finance themselves.

The entering class of 1936 numbered 6,072 students. Only 4,355 of these (72.0%) were members of the 1940 graduating class. Other graduates of 1940 were those students who finished their work in three years and those who began the study of medicine previous to 1936 as shown above.

These figures are comparable to those of previous years.

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Students from Scottish Medical Schools

One medical school, not approved, has admitted to its classes 58 of these students and three from other foreign medical schools—all being Americans: 24 to the freshman class (total number

admitted, 70); 20 to the sophomore class and 17 to the junior class. In each instance, one or more years were deducted from the total attendance of the students in the foreign schools. Six of the freshmen are repeaters who had been dropped by one of our own schools, leaving 40 students in the freshman class who had not previously attended a medical school.

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Medical Colleges: A Public Utility

It is an indisputable fact that the public is not aware that a medical school is a public utility of the greatest importance to its welfare. And, that a medical school is not a profit making institution. Much is being taken for granted. For example, it is the general belief that student fees cover not only the cost of maintenance but give a profit. The budget of a medical school is the largest item in the operation of a university. It must be met by contributions, by returns from endowments or by legislative appropriation. The benefits accruing from the operation of the medical school go, in their entirety, to the public for the maintenance of health and the care of the sick. Faculties give their time, effort and skill to the attainment of these purposes. Why, then, should not the public assume a share of the burden?

Trustees of these institutions have a heavy responsibility in furthering the aims and objects of the medical school. Unfortunately, and undeniably, they do not always rise to the occasion. They, too, take too much for granted. It would seem that a great deal of propaganda should be made by these officials—and others—to bring to the attention of the public that the medical school is maintained for their welfare. It supplies the men and women who will play a large part in preventing illness and in its cure. Is anything of greater importance to the people than health? Does anyone play a larger role in the maintenance of health than the physician? Should not every effort be made that the

supply of good physicians continue? Should not research, through which all the fine additions to medicine have been made, be supported adequately? Surely, it is worth while to give serious thought to these matters. No better use of available funds can be made than to give support to the work of the medical school. It reaches out into all communities, the small ones as well as the large ones. Every person is concerned about maintaining his health. Health is a large economic problem, one which can be solved only by the good physician. Therefore, the institution which is doing all in its power to provide good physicians, often with limited funds, should receive wholehearted support from every possible source. Medical schools must be "sold" to the public. The public must be made aware that the medical school is not a private institution but a real public utility, one which does not give financial returns but which does pay large health dividends. But to do so, it must have adequate financial support.

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Robert J. Terry

Dr. Robert J. Terry, professor and head of the department of anatomy in Washington University School of Medicine for forty-six years, will retire in June. Dr. Terry is well known as an outstanding anatomist and teacher. He will be succeeded by Dr. Edmund V. Cowdry, professor of cytology.

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Industrial Hygiene and Public Health

The Surgeon General of the U. S. Navy requests: "Information concerning institutions at which it might be practicable to arrange short courses in medical department specialties for mem-

bers of the medical corps of the Navy and of the U. S. Naval Reserve, prior to or during any possible national emergency. The specialties for which the Bureau is particularly interested in making tentative arrangements for courses of training are "industrial hygiene" and "public health." The information desired should be the number of persons the institution could accept at one time, duration of courses of instruction and the cost of instruction."

Please send this information immediately to the office of the Association of American Medical Colleges to be transmitted as provided for by the resolution adopted at the Ann Arbor meeting. This is an urgency.

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Preparation for the Study of Medicine

Recognizing the widening public, cultural and educational interests of medicine, the Association of American Medical Colleges, accepting the recommendation of the Advisory Council on Medical Education, advises its member institutions and the colleges sending students to schools of medicine, that, conformably to the By-laws of the Association of American Medical Colleges, the collegiate preparation of medical students above the necessary prerequisites to the medical curriculum in biology, chemistry and physics, as defined by each medical school, the further educational development of prospective medical students be directed by the same viewpoints as guide the development of any other collegiate student; the intent of this suggestion being to promote the general education of the medical student rather than his education along a specific or a preprofessional directive.

College News

Emory University School of Medicine

A gift of \$550,000, from the Joseph B. Whitehead Foundation, has been received for constructing and equipping a new surgical building to be named the Conkey Pate Whitehead Memorial. It will be erected as a six story wing to the present Emory University Hospital. It will have five major and five minor operating rooms, an X-ray department, rooms for 60 patients and administrative offices of the medical school. Dr. R. H. Oppenheimer, dean of the School of Medicine, is also medical director of the hospital. Dr. Daniel C. Elkin, who occupies the Joseph B. Whitehead chair of surgery—also endowed by the Whitehead Foundation—is head of the department of surgery. Work on the new wing will be started as soon as the plans are completed and approved.

University of Minnesota Medical School

The second annual Elias Potter Memorial Lectures in the Physiological Sciences were delivered May 1 and 2 by Dr. Ernest Gellborro of the Departments of Physiology and Psychiatry of the College of Medicine of the University of Illinois. His subjects were "The Neurological Basis of Some General Adjustment Reactions," and "Investigations on the Central Excitation of the Autonomic Nervous System and Their Significance for the Problem of Schizophrenia."

Dr. Arno B. Luckhardt of the department of Physiology, at the University of Chicago, delivered the William Root Lecture sponsored by Alpha Omega Alpha, April 29th. His subject was "Dr. William Beaumont and the Medical Epoch of the Northwest Territory."

Dr. Lucien Brouha, physiologist of the Grant Foundation at Harvard University and professor of human biology

at the University of Liege, Belgium, gave an illustrated lecture on the functions of the autonomic nervous system, April 22.

The Pathology Department will give a short summer course in surgical pathology from June 16 to July 25th, twenty hours each week. A tumor clinic will be given each week and an X-ray demonstration of bone tumors.

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University of California Medical School

Announcement is made of summer courses to be held from May 19th to August 15th. Subjects included in the course will be, "Physical Diagnosis," "Practical Work," comparable to a clinical clerkship, "Postmortem and Surgical Pathology Practice."

The courses are intended, primarily, for students of the University of California and other medical schools, but graduates may enroll. The fee for California students is \$1, a locker fee; for students from other schools, \$1 plus \$20 for tuition. Applications should be addressed to the Dean's Office, University of California Medical School, Medical Center, San Francisco.

These courses do not entitle participants to credits. A certificate of attendance will be given.

Walter F. Cannon, M.D., Sc.D., LL.D., George Higginson professor of physiology at Harvard Medical School and Hitchcock Professor at the University of California for February, 1941, participated in the Staff Conference of the Division of Medicine on February 12. Dr. Cannon discussed the autonomic nervous system.

The second of a series of discussions on psychosomatic medicine and the socio-personal problems of the sick, was held January 28. The Division of Pediatrics, under the leadership of Dr. Francis S.

Smyth, professor of pediatrics, presented a symposium and round table discussion on its social service needs. The third meeting of this series was held on February 28, the program having been devoted to demonstrations of clinical material and discussions of the somatic, emotional and social components in gastro-intestinal disorders.

Stacy R. Mettier, M.D., director of the Refresher Courses, has announced that postgraduate work will be given at the Medical School in June, 1941. The program will include courses by the Division of Medicine in the fields of heart disease, disease of the blood, and of the gastro-intestinal tract, and endocrine disturbances. The Division of Surgery will offer courses having to do largely with traumatic surgery, including a fracture course and the treatment of infections and hand injuries. The Division of Obstetrics and Gynecology will summarize the most recent advances in childbirth and the care of female diseases.

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*Long Island
College of Medicine*

A Symposium on Clinical Endocrinology was held March 25, 1941. The speakers included: Dr. Murray B. Gordon, Department of Pediatrics, "Hypothyroid States in Children"; Dr. Ephraim Shorr, Department of Medicine, Cornell University School of Medicine "Emotional Concomitants of Ovarian Dysfunction"; Dr. Aura E. Severinghaus, Department of Anatomy, College of Physicians and Surgeons, Columbia University "Cytological Basis of Anterior Pituitary Functions"; Dr. Robert S. Hotchkiss, Department of Surgery (Urology) Cornell University, School of Medicine "Sterility and Fertility in the Male"; Dr. David Marine, Director of Laboratories, Montefiore Hospital "Exophthalmus in Graves' Disease"; Dr. Edward Tolstoi, Department of Medicine, Cornell University School of Medicine "Newer Concepts in Diabetes Mellitus"; Dr. George E. Anderson, Brooklyn Hospital "Management of Diabetes Mellitus."

A film, titled "Clinical Endocrinology," furnished by Parke, Davis & Co., was shown.

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*University of Toronto
Faculty of Medicine*

The fifteenth annual Donald C. Bal-four lecture was delivered April 5th by Dr. David Cheever, Associate Professor of Surgery, Emeritus, Harvard Medical School. His subject was, "War, Its Tolls and Its Tributes." April 5th is the 114th anniversary of the birth of Lord Lister.

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*University of Rochester
School of Medicine and Dentistry*

Dr. James H. Sterner, Director of the Laboratory of Industrial Medicine at Eastman Kodak Company, Dr. Rufus B. Crain and John L. Norris, members, have been appointed instructors in medicine (Industrial Medicine) on the part time staff.

Dr. Robert H. Marks and Dr. William B. Test, members of the Staff of the Iola Sanatorium (tuberculosis) have been appointed instructors in medicine, (tuberculosis) part time.

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*University of Alabama
School of Medicine*

Dr. Seale Harris, Jr., of Birmingham, addressed the sophomores March 7th on "The Ethics of Medical Practice," at that time distributing to the sophomores the Code of Ethics of the American Medical Association.

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Harvard Medical School

Dr. William E. Ladd, clinical professor of surgery has been named the first incumbent of the William E. Ladd professorship of surgery. The new chair was endowed by a group of friends of Dr. Ladd and named in recognition of his contributions to the field of surgery in children. Dr. Ladd graduated at Harvard in 1906.

New York Medical College

Dr. J. A. W. Hetrick ertwhile secretary of the faculty, has been appointed acting dean of the College. Notice of the sudden death of Dr. Claude A. Burrett, president, was published in the March issue of the JOURNAL.

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University of Virginia Department of Medicine

At the meeting of the University of Virginia Medical Society held March 7th, Drs. Walter Freeman, Professor of Neurology and Dr. James Watts, Associate Professor of Neurosurgery at George Washington University School of Medicine, spoke on the subject, "Pre-frontal Lobotomy in Mental Disorders."

The Virginia Section of the American College of Physicians met at the University of Virginia on March 13th. The following program was presented: Drs. Dudley C. Smith and Walter Herold spoke on "Gonorrheal Keratosis"; Drs. Andrew D. Hart, Jr. and Ralph B. Houlihan discussed "Haverhill Fever Following Rat Bite"; Dr. Staige D. Blackford presented a paper on "Abnormal Cholecystograms: Developments in Ninety Untreated Patients"; Drs. Edwin P. Lehman and George M. Lawson discussed "Clinical and Bacteriological Studies with Sulfanilylguanadine"; and Dr. Gilmore Holland spoke on "Electroencephalographic Studies in Myoclonia."

A new \$375,000 addition to the University of Virginia Hospital was opened recently. The five story building provides for new administrative quarters, six operating rooms treatment rooms, more space for medical research and a capacity of one hundred and seventy-one beds. This gives the hospital a total of five hundred beds, with three hundred and seventy-five for teaching purposes. On the ground floor are new quarters for the orthopedic outpatient department, additional quarters for the department of urology and storage space. On the first floor are administrative offices and two surgical wards; on the second the operating rooms and two surgical

wards; on the third are two medical wards, a clinical laboratory and the office of the department of internal medicine; on the fourth are quarters and wards for the departments of ophthalmology and otolaryngology.

April 3rd, the Southern Society of Clinical Surgeons spent the first day of their three-day annual meeting at the University of Virginia.

The twenty-seventh Post-Graduate Clinic sponsored by the University of Virginia Medical School and the Division of Extension was held on April 11th. The following program was presented: Sulfonamide Compounds in Medicine by Dr. J. E. Beckwith; Sulfonamide Compounds in Surgery by Dr. W. H. Parker; Fluid Balance by Dr. Staige D. Blackford; Administration of Fluids by Dr. W. R. Hill; Digitalis Therapy by Dr. J. Edwin Wood, Jr. and Dr. John Hortenstine; Diuretics by Dr. E. M. Landis; Treatment of Deficiency States by Dr. H. B. Mulholland; Treatment of Anemias by Dr. Byrd Leavell; The Female Sex Hormones by Dr. Tiffany J. Williams; and The Male Sex Hormones by Dr. Samuel Vest. Eighty-two physicians attended the Clinic.

The third Alpha Omega Alpha Lecture was delivered April 11th by Dr. Homer W. Smith, professor of physiology at the New York University College of Medicine. Dr. Smith spoke on the subject "The Quantitative Study of Renal Function."

The Phi Lambda Kappa Lecture was delivered March 31st by Dr. Samuel Loewenberg, professor of medicine at the Jefferson Medical College of Philadelphia. He discussed "Endocrinopathies."

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Medical College of Virginia

The General Education Board of New York has made a grant of \$168,000.00 for the further development of the Saint Philip school of nursing, the unit of the college separately organized for the education of Negro nurses. The grant will add and furnish approxi-

mately seventy-four rooms to the nurses' residence, Saint Philip Hall, and will substantially enlarge the library and teaching unit. The estimated cost of this aspect of the new development is \$130,000.00. The grant also provides \$38,000.00, over a six-year period, on a decreasing basis biennially for substantially strengthening the teaching program, especially on the clinical side.

The annual Stuart McGuire lectures and spring postgraduate clinics were delivered April 24 and 25 by Dr. Alfred Blalock, Vanderbilt University. Efforts are being made to secure a British surgeon and a prominent surgeon of the United States Army for the postgraduate clinics which will emphasize traumatic surgery. In connection with the lectures and the postgraduate clinics the ex-interns of the hospital division of the institution will hold their annual reunion.

Lectureships sponsored by various fraternities were given during February and March as follows: Dr. Fuller Albright, assistant professor of medicine, Harvard Medical School, spoke on "Some Aspects of Metabolic Bone Diseases," sponsored by Alpha Omega Alpha, honorary medical society, on February 28; Dr. Eugene M. Landis, professor of medicine, University of Virginia, department of medicine, spoke on "Capillary Physiology and Fluid Balance," sponsored by Sigma Zeta, honorary scientific fraternity, on March 12; Dr. Walter E. Vest, Internist, Huntington, West Virginia, spoke on "Some Medical Aspects of Shakespeare," sponsored by Phi Beta Pi medical fraternity on March 14. The Psi Omega dental fraternity will sponsor a lecture by Dr. William J. Gies on May 4.

Under the auspices of radio station WRNL of Richmond, a special campaign was put on recently to raise funds for iron lungs for the hospital division of the college. With the funds thus raised the institution has purchased two iron lungs for adults and one for infants; these have been installed in the new two and a quarter million dollar hospital which was dedicated December 5, 1940.

University of Vermont College of Medicine

At its present session the legislature of the State of Vermont increased the annual appropriation for the College of Medicine by \$50,000 to meet the request of Dean Hardy A. Kemp who pointed out the further needs of the College if it is to continue to serve the State in the best possible manner. It is almost the only source of supply of physicians for Vermont since its student body consists virtually of native Vermonters and few of the graduates leave the State to practice. Dean Kemp stated that of 176 graduates since 1930, only 15 have left the State. Six have gone into other medical work than private practice; 155 are still practicing—an unexcelled record for any state medical college.

Two valuable gifts, one of them making available important historical material from medical science's discoveries in the physiology of digestion, and the other adding extensive publication reference material on immunology, have come to the Medical Library of the College of Medicine of the University of Vermont, through Dean Hardy A. Kemp.

Dr. Elliott F. Joslin, Director of the George F. Baker Clinic, Boston, and Professor of Clinical Medicine, emeritus, Harvard Medical School, addressed the Osler Clinical Society March 12th, speaking on the subject "The Application of Recent Physiological Studies of the Treatment of Diabetes Mellitus."

A complete file of 37 volumes of the Journal of Immunology, beginning with Volume 1, 1916, is the gift to the Library of Dr. J. H. Black of Dallas, Texas.

Twenty-seven photostats from the rare William Beaumont collection of the Washington University School of Medicine Library, St. Louis, Missouri, have been sent to the Vermont Medical Library by Miss Ella B. Laurence, Librarian at the Missouri medical school.

The photostats include title pages of the different editions of "Experiments and Observations of Gastric Juice and

the *Physiology of Digestion*," Dr. Beaumont's pioneer work, based on his experiments with Alexis St. Martin, who had by accident received a bullet wound in the wall of his stomach, leaving an opening which allowed observation of the action of the stomach in digestion.

There is a copy of a page from Dr. Beaumont's notebook giving the account of Alexis St. Martin's accident. Other photostats of Dr. Beaumont's notes include a manuscript page with an account of numerous experiments on St. Martin's stomach, and a page from the Doctor's notebook kept during the War of 1812 describing the battle of Little York, now Toronto.

Beaumont's license to practice medicine, granted June, 1812, by the Third Medical Society of the State of Vermont, is of State interest.

There are facsimilies of five pages of articles of agreement between Dr. Beaumont and Alexis St. Martin, made Oct. 16, 1832, in which St. Martin agreed to submit to the experiments of Dr. Beaumont under conditions which were fully set forth.

Several letters are among the collection of photostats, dealing with various subjects. Two of them had to do with a search for Alexis St. Martin, and with the engaging of St. Martin and his wife to remain with Dr. Beaumont two or three years. One letter was from St. Martin himself, somewhat later, (June 5, 1838), reporting an offer from the American Physiological Society of Boston to engage him for experimental purposes, and proposing to join Dr. Beaumont if the latter wished.

Several of the letters and documents tell of honors coming to Dr. Beaumont. There is a notice of election to honorary membership in the Medical Society of the Territory of Michigan, March 3, 1825. There is Dr. Beaumont's commission as surgeon of the United States Army, signed by President John Quincy Adams, Feb. 15, 1828. There is a copy of the letter informing Dr. Beaumont of his election to the chair of surgery of the Medical Department of St. Louis

University, dated Oct. 4, 1836, and coming from William G. Eliot, Jr., Secretary of the Board of Trustees of the Medical Department and founder of Washington University in St. Louis. A copy of the Chester Harding portrait of William Beaumont, a certificate of copyright of the first edition of Dr. Beaumont's book, and four pages of the first four experiments, are among the Beaumont documents which have now become available for medical students and physicians at the Medical Library.

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*University of Cincinnati
College of Medicine*

Dr. M. A. Blankenhorn, professor of medicine, gave a series of postgraduate lectures to the Honolulu Medical Society at their annual meeting held in April.

Dr. Charles F. McKhann, professor of pediatrics in the University of Michigan, conducted the senior class in pediatrics recently. Dr. A. Graeme Mitchell, professor of pediatrics was visiting pediatrician at the University of Michigan for a week in March.

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*University of Mississippi
School of Medicine*

The Medical School recently received a three year grant totaling \$7,500 for the Rowland Medical Library. The grant is part of the University Library Fund created by grants from the General Education Board and matched by the University.

The plans of the Rowland Medical Library are to use the first year's grant to complete the files of the scientific periodicals now carried by the Library. In most cases the files of journals will be completed back to 1920, but in special cases the files will be completed back to volume one. The program will remedy gaps which now exist in the files of important journals. It is also proposed to use the fund to purchase additional periodicals, monographs and special texts.

The routine program of the Library will be pursued as usual with funds from the regular budget and "The Friend of the Library," an organization sponsored by Dr. P. W. Rowland.

At present the Rowland Medical Library contains 7,000 volumes of which 100 volumes comprise new monographs which have been added since the first of the year. The Library carries currently 130 scientific periodicals covering the fields of scientific and clinical medicine, and associated fields.

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*Bowman Gray School of Medicine
of Wake Forest College*

Dr. Nathan B. Van Etten, New York, President of the American Medical Association, was guest speaker when the cornerstone was laid for the new Bowman Gray School of Medicine April 16, in Winston-Salem. Other speakers included Drs. W. Reece Berryhill, dean, University of North Carolina School of Medicine, Chapel Hill; Wilburt C. Davison, dean, Duke University School of Medicine, Durham; Wingate M. Johnson, Winston-Salem, president of the board of trustees, and Thurman D. Kitchin, president of the college. John R. Cunningham, D.D., president of Davidson College, Davidson, gave an invocation, and Mrs. Bess Gray Plumly, sister of the late Bowman Gray, whose gift made possible the new school, laid the cornerstone.

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*University of Indiana
School of Medicine*

This School has announced plans for a military medicine educational program said to be the first in the country and expected to be used later in many states as a part of the national defense program. Open to all licensed practicing physicians in the state, the project started January 31, as part of the faculty seminar. Major I. F. Peak, regular army military corps officer assigned to the R.O.T.C. unit of the school, gave the first lecture. He discussed operation of army general hospitals and the feasi-

bility of such hospitals in connection with regularly established medical centers comparable to the Indiana University group of hospitals.

Ensuing lectures will be offered weekly or bimonthly, depending on interest shown by Indiana licensed physicians. The course subsequently may develop into one offering detailed education in military medicine dealing with control of pestilence, emergency treatment and surgery of wounded soldiers and civilians, and other phases of war-time activity.

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*Western Reserve University
School of Medicine*

Dr. E. E. Ecker, associate professor of Immunology, with his associate, Dr. Louis Pillemer, discussed recent work in immunochemistry before the New York Academy of Sciences, meeting at the Museum of Natural History, New York City, March 28. He described his recent studies, supported by the Commonwealth Fund of New York, which have led to purification and identification of certain factors in the blood serum concerned with natural immunology, explaining that there are two such factors, one a protein and the other a protein with a carbohydrate "arm."

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*University of Southern California
School of Medicine*

Dr. Joseph Brennemann has been appointed professor of pediatrics and superintendent of the Children's Hospital of Los Angeles. After serving three years beyond the retirement age, Dr. Brennemann resigned, January 1, as chief of staff of the Children's Memorial Hospital, a position he had occupied since 1921. Dr. Brennemann had also been professor of pediatrics at the University of Chicago School of Medicine, since 1921.

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*University of Michigan
Medical School*

Dr. Charles W. Edmunds, for many years professor of pharmacology, died March 1 of coronary thrombosis.

General News

Training Physicians for Great Britain

Just before he died, Lord Lothian, British Ambassador to the United States, asked The Rockefeller Foundation whether it would consider the possibility of giving a number of British medical students the opportunity to complete their training in the medical schools of the United States and Canada. While medical students in England are not subject to draft, the air raids in London and elsewhere throughout Great Britain have imposed excessive demands upon all medical schools and teaching hospitals. Destruction has been extensive. The conditions for thorough and adequate teaching in medicine are therefore severely deranged. A considerable number of the teachers, moreover, have been called to military or special civilian duties.

Lord Lothian's suggestion was warmly supported by leading British medical authorities, and as a result the Foundation appropriated \$100,000 to initiate the plan.

Twenty-five leading medical schools in Canada and the United States have indicated their willingness to accept these new students, and some have offered to remit tuition. An officer of the Foundation is now in England working with a British committee on the details of selection and transportation. Candidates will be considered not only from the London area but from the provincial universities in England, Scotland and Wales, where extensive damage has also been done to clinical teaching services. Arrangements are being made for the local supervision of the students in America and for the acceptance by British medical authorities of their American training, when successfully completed, as the equivalent of the British licensure. Appointments will be for not more than three years and will provide modest living expenses and tuition. The three-year period is likely to

include two years of clinical training and one year of internship. The student will provide his own cost of travel. He will be required to return to Great Britain upon the termination of his scholarship. The scholarship will be administered by the authorities of the school to which he is assigned, and it is not expected that he will be enrolled as a candidate for an American degree.

Unless unforeseen difficulties occur, it is anticipated that some of the students will arrive in America this spring, and the balance by the opening of the fall term. The Foundation intends to consider a possible extension of the plan if the first year's experience is successful.

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An Opportunity to Study Tropical Medicine

At this time when there is a distinct likelihood that our government may have to send troops into tropical countries, it is worth noting that a course in tropical medicine is to be given at the New York Postgraduate Medical School, Columbia University, during May, 1941. It is the first time such a course has been attempted in this country, and a notable group of authorities have agreed to undertake the instructional responsibilities. The subjects under discussion will include malaria, yellow fever, intestinal parasites, filariasis, the dysenteries, tropical skin disease, kala azar and leptospirosis, as well as the problem of sanitary engineering and tropical hygiene. The purpose of the course is to bring to physicians an authoritative review of the fundamentals of tropical medicine as well as the more recent advances in research in the field. The course will include lectures and demonstrations, and clinical and laboratory material will be available. Some practical work will also be done. To many American physicians tropical medicine will appeal as a new and fascinat-

ing subject, and it is anticipated that the course will prove a popular venture in postgraduate education.

Internships in Naval Hospitals

The Surgeon General of the U. S. Navy announces that interns will be assigned to additional naval hospitals for training beginning July 1, 1941.

Examinations for appointments as acting assistant surgeon for intern training at U. S. Naval Hospitals will be held June 23-26, inclusive, at all the larger naval hospitals in the continental limits of the United States. Application for authorization for these examinations should be forwarded to the Bureau of Medicine and Surgery on or before May 23. Legislation recently enacted by Congress makes it possible to offer an additional large number of these appointments. Applicants must be citizens of the United States over the age of 21 but less than 32 at the time of appointment, must be graduates or members of the graduating class of recognized medical schools and must meet the physical and other requirements for such appointments. Appointments as acting assistant surgeon with the rank of lieutenant (junior grade) for temporary service for a period of not more than eighteen months will be issued. After the appointee has served twelve months of intern training he may apply for appointment as lieutenant (junior grade) in the Medical Corps, U. S. Navy. Information concerning these appointments together with application blanks may be obtained by addressing the Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

Cook County Hospital Internships

For the first time in the history of Cook County Hospital, its internships will be open to eligible students from all medical schools in the United States accepted by the Council on Medical Education and Hospitals of the Ameri-

can Medical Association. The internships are strictly by Civil Service examination.

Cook County Hospital is a charitable institution maintained by taxation and supervised by the Cook County Board of Commissioners. It is a general hospital of 3,300 beds and is accepted for internship by the Council on Medical Education and Hospitals of the American Medical Association. During the year 1940, 91,300 patients were cared for in the various divisions of the hospital, with a daily average of 3,108. In addition to this number, there were 255,724 visits to the outpatient departments during the year and 29,693 first aid cases.

The hospital is under the direct management of the Attending Staff operating through an Executive Committee composed of the heads of each department. This Committee formulates the medical policies and plan of organization. The Attending Staff consists of 166 physicians divided among the various specialties, practically all of whom are teachers in one of the five medical schools in Chicago. The attending men hold their positions by virtue of Civil Service examinations which are held at intervals of six years. There is also one associate attending physician on the service of each attending man who is appointed by the medical school with which the individual attending men are connected in a teaching capacity.

At the present time the house staff comprises 102 interns, 91 residents and 31 fellows. The internship is rotating in character and is of 18 months duration. One group of approximately 34 interns who head the Civil Service examination list is taken into the hospital on July 1 following graduation. The second group begins service on January 1. The period of service is divided as follows: first six months, 3 months each as junior intern in medicine and surgery; second six months, six specialty services of one month's duration; third six months, 3 months each as senior intern in medicine and surgery. Interns wishing to continue their education in a

specialty are eligible for appointment to the resident staff of the hospital.

Cook County Hospital is essentially a teaching institution, offering its clinical material to the various medical schools in Chicago. Instructional privileges are given to medical students in the matter of amphitheatre clinics, ward conferences, bedside instruction and clinical clerkships. Because of this type of instruction, no limitations are placed on the medical work-up and observation of such patients used for clinical study and presentation.

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Hospital Administration Course at Cornell University

A two weeks' course, beginning July 14th, on hospital administration will be held under the auspices of Cornell University, at Ithaca, New York. Dr. Joseph C. Doane, medical director of the Jewish Hospital, Philadelphia, will be in charge. He will be assisted by Donald Smelzer, director of the Germantown Hospital and Dispensary, Philadelphia.

Classes will be held each day. They will consist of lectures and conferences. Each student will prepare a thesis on an assigned subject. Tuition for the course will be \$24.

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Certifying Boards Become Independent

The American Board of Anesthesiology and the American Board of Plastic Surgery, which have been affiliate or subsidiary boards of the American Board of Surgery, were advanced to the status of full and independent boards at a meeting of the Advisory Board for Medical Specialties in Chicago, February 16. There are now fifteen special certifying boards. Drs. Willard C. Rappleye, New York, and William P. Wherry, Omaha, were reelected president and vice president, respectively, of the Advisory Board for Medical Specialties. Dr. Paul Titus, Pittsburgh, who has been secretary-treasurer of the board since its inception in 1933, resigned that position and Dr. Clarence Guy Lane, Boston, was elected to succeed him.

Selective Service In Re Medical Students

Official Release from National Headquarters of Selective Service to
State Directors, Local and Appeal Boards

"Medical students represent the only source of supply for further requirements necessary to supplement the present force and to replace those people leaving the profession. Currently, there are approximately 5,000 such students entering the profession each year. When it is realized that about 27,000 of the nation's physicians are 65 years of age and older and that 3,800 are lost through death to the profession each year, this supply is not large. At present it is estimated that there are approximately 155,000 practicing physicians in the country and approximately 25,000 engaged in teaching, research, public health work, or who have retired. The effect of reducing this supply through selection for service under the Selective Training and Service Act of 1940 in a non-professional capacity would be cumulative, resulting in an increasing reduction of physicians available for service in either a civil or military capacity. It seems of paramount importance that the supply be not only maintained, but encouraged to grow and that no student or intern who gives reasonable promise of becoming an acceptable M.D. be called to military service before attaining to that status."

(Committee on Preparedness, Association of American Medical Colleges)

Abstracts of Current Literature

Why Latin?

One of the fields in which controversy has been perennial during the centuries is that of the value of the study of the ancient classics. They have alternated in periods of elevation and depression many times since the fall of Rome. For a generation or so they have experienced a marked decline in our educational program in America.

But recently there have been signs that prominent educators have begun to "view with alarm" the results of this campaign against the classics. College presidents have been writing magazine articles. Not long ago the present writer listened to an address of welcome to a distinguished gathering of classicists by the president of one of our largest state universities. Characterizing himself as "a hard-boiled scientist" he took us severely to task for neglecting more ardent propagandizing for our subjects, expressing profound anxiety for the future of education in the United States if the trend of apathy toward Greece and Rome continue.

The dilettantish acquaintance with any modern language usually attained in a high school removes these languages far from the front line in any competition for recognition as most important. The solidity of their foundation and the breadth of their contacts are not comparable with those of Latin. But for their protracted and intense study, if that is contemplated, Latin furnishes the most substantial basis.

What should be given to our youth is a subject which will be of as much intrinsic value as possible for everyday living, which will involve all possible disciplinary methods and which will be continued long enough to make possible a masterful acquaintance with the subject, rather than a casual smattering. For these results there is nothing comparable to Latin.

So far as disciplinary value is concerned, Latin and mathematics vie for recognition, but Latin more than holds

its own. It demands absolute accuracy in the minutiae of detail, judgment in the choice of expression and a broad interest in humanity and life.

Many elaborately prepared and carefully conducted tests prove by an overwhelming number of examples the enormous advantage that Latin-trained students have in understanding English.

What is a more practical everyday accomplishment than to be able to manage a good English vocabulary in reading, writing and talking? It opens the way to all other branches of education. In whatever walk of life it marks the possessor as educated. It gives him power in dealing with his fellow men in business or in pleasure.

Great literature inspires, broadens the vision, stimulates the nobler emotions. No version of it in another tongue ever serves as a worthy substitute for the original. History, oratory, epic, lyric, satire and epistle make us at home with life, and that is every man's task—to understand and to adapt himself to life. Latin literature covers nearly two millennia. It lies at the foundation of all modern literature and permeates whatever has been written since the days of the Roman empire. It is true that the regions of Latin literature ordinarily accessible to secondary-school pupils have often been circumscribed within too narrow limits. It is too bad that boys and girls should grow up to suppose that the Gallic War, the Catiline orations and a part of the *Aeneid* are all that is worth while in Latin literature. Happily, Latin teachers and Latin textbooks have made great advancement in that respect in the past generation.

A necessary by-product of the proper study of Latin is acquaintance with Roman history and civilization, which form an essential part of the foundation of modern civilization. The political, economic, legal, ecclesiastical, social and literary life of Rome is thoroughly interwoven with the life of our own day.

And the knowledge of the former contributes vitally to our understanding of the latter. The connection is patent in our reading, our thinking, our acting every day. Just as with the linguistic side of Latin study, this knowledge of ancient life is something that stays by us for constant use, not to be forgotten shortly together with so much of our school study, but something actively useful, and increasingly so with the passing years.—HARRINGTON, KARL P., *School and Society*, 53:322-326 (Mar. 15), 1941.

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Huxley on Higher Education

Huxley was among those who believed that English higher education was not living up to its opportunity as long as it continued to function merely as a preserver of the *status quo*, with a loyal devotion to the traditional subject matter and a disregard for the intellectual interests that had been forced upon the attention of thinking men. The university, according to Huxley, is not an establishment in which those of one generation are to engage primarily in reflecting upon the achievements of the past and to weave about them the halo and majesty of authority, while life all about is continually confronted with an ever increasing number of new problems.

The university is, according to that conception, not merely a place where knowledge is transmitted, but also a place where knowledge is brought into being. The university is not to follow the march of progress, but it is to take its place at the head of the procession. It is to bring new knowledge to mankind and thus to function as a civilizing agent of first importance. The university "will be a place for men to get knowledge; and not for boys to get degrees."

Since the true purpose of the university is not only to transmit funded knowledge to the rising generation, but also to increase the sum total of learning, it is obvious that it is not suited to the interests and the capacities of all men. To advance the cause of human knowledge is the peculiar responsibility

of those who possess the intellectual capacity and the leisure to do so. This is not the democratic conception of higher learning that generally prevails in the United States, especially among the state-supported institutions. According to Huxley's view—and this view has been typical of Englishmen for centuries—higher learning is not for the masses, but for those of superior abilities. There is, however, at least one point of difference between Huxley's view on university education and that of most other Englishmen. While there appears to have been common agreement that a university education is the privilege of the intellectually superior, Huxley does not agree that the privilege should be restricted to those of social standing. It is rather his view that, while by the very nature of higher learning a good intellect is a prime requisite to worthy achievement, social standing is not essential.

Higher education for those who have the capacity for it is not to be in any sense merely a mark of distinction or an emblem of culture, but the equipment by means of which the higher services to civilization are to be performed.

To summarize Huxley's essential views of the nature and function of higher learning the following statements may be made: (1) The modern university has a progressive function in a dynamic world, as the university of the past centuries was thought to have a conservative function in a static world. The university in a complex, dynamic civilization must effect the transmission of the knowledge that has proved its value in human living, and promote the discovery of new knowledge that will increase the well-being of mankind. (2) The method to which higher learning must become accustomed, in so far as the desire for the discovery of new knowledge is to be satisfied, is the scientific method. To acquire a genuine thirst for truth and knowledge, and to achieve the attitude and the skill of the scientific method are the highest accomplishments of the university that Huxley could visualize.—GRUSENDORF, A. A.: *School and Society*, 53:326-329, (Mar. 15), 1941.

Book News

The Therapeutics of Internal Diseases

Volume III. George Blumer, M.D., David P. Smith Clinical Professor of Medicine, Yale University School of Medicine, Supervising Editor, and Albert J. Sullivan, M.D., Adjunct Clinical Professor of Medicine, George Washington and Georgetown Universities Schools of Medicine, Associate Editor. D. Appleton-Century Company, New York. 1941. Price, \$10 (Sold only as a set, 4 volumes, \$40).

In this volume the discussion of infectious diseases continues, with a consideration of the types of parasitism due to the higher classes of vegetable pathogens, the molds and allied organisms; infestation by animal parasites; common intoxications and conditions due to the action of physical agents; a general chapter on preoperative care in diseases due to allergy, the avitaminoses, common skin diseases, diseases of metabolism and of the endocrine organs, the respiratory and circulatory systems. All chapters are written by men of acknowledged authority in their respective fields. Problems of treatment are presented in a practical manner.

Science and Seizures

New Light on Epilepsy and Migraine. By William G. Lennox, M.D., Assistant Professor of Neurology, Harvard Medical School. Harper & Brothers, New York. 1941. Price, \$2.

This book explains the kinship and differences between these two disorders. It presents fresh information derived from a study of electrical waves of the brain. It skims the statistical cream from the medical histories of 2500 patients. In short, it is a working guide to the management of convulsive and headache seizures—even to the use and abuse of the newest drugs, dilantin and ergotamine. Dr. Lennox answers, out of his long experience, the many practical questions concerning education, occupation, marriage and institutional care—and discusses concretely the social-economic problems of the millions of epileptic and migraine victims.

The Doctor and the Difficult Child

By William Moodie, M.D., Medical Director London Child Guidance Clinic. The Commonwealth Fund, New York. 1940. Price, \$1.50.

This book, written in simple, unaffected language, free from jargon and theoretical generalizations, offers to the pediatrician,

the general practitioner, and the intelligent layman practical suggestions with regard to emotional problems encountered in daily practice.

Dr. Moodie shows how an approach to a child's problem may be made through interpretation of his play, his drawings, and his fantasies, and offers helpful suggestions toward winning the confidence of young patients and diagnosing their difficulties.

The Merck Manual of Therapeutics and Materia Medica

Published by Merck and Company, Rahway, New Jersey. 7th Ed. 1940. Price, \$2.

Multum in parvo. A handy little book to keep on the desk for quick reference when deeper reading is not possible at the moment. It is literally bursting with useful information. Every student should have a copy and make good use of it. Merck deserve commendation for this fine piece of work.

L. Emmett Holt

Pioneer of a Children's Century. By R. L. Duffus and L. Emmett Holt, Jr., with foreword by Edwards A. Park, M.D., Professor of Pediatrics, Johns Hopkins University. D. Appleton-Century Company, New York. 1940. Price, \$3.

A biography. A splendid contribution to an eminent scholar who was the outstanding figure in American pediatrics of his time, a great physician and an educator, the teacher of many eminent pediatricians who have carried on according to his ideals.

Matching Youth and Jobs

A Study of Occupational Adjustment. By Howard M. Bell. Prepared for the American Youth Commission. American Council on Education. 1940. Price, \$2.

This report, sponsored by the American Youth Commission in cooperation with the Employment Service Division of the Social Security Board, is an attempt to set down in simple, practical terms just what an occupational adjustment program is and how it may function through agencies present in most communities, especially school systems.

Coupled with extensive fact-finding research in representative areas, practical programs were developed to promote and demonstrate ways in which needs might be effectively met and to formulate patterns for local action.

A Surgeon Explains to the Layman

By M. Benmosché, M.D. Simon and Schuster, New York. 1940. Price, \$3.

This book does the fascinating job of translating surgical knowledge and procedure into language every layman can understand. It contains those particular facts about the most frequent operations that countless patients have wished their doctors had the time to sit down and explain—and that countless doctors have wished were available in a book, so that patients might be referred to it.

It has been written to help dispel, through greater understanding, that unnecessary and heartbreaking fear which surrounds the word "operation." The brilliant and dramatic result takes the reader into the very mind of the surgeon grappling with his problems, tells exactly what he does and how and why he does it.

First Aid in Emergencies

By Eldridge L. Eliason, M.D., Professor of Surgery, University of Pennsylvania School of Medicine. 10th Ed. J. B. Lippincott Company, Philadelphia. 1941. Price, \$1.75.

This is a modern, dependable, complete handbook designed for use in emergencies that arise in everyday life . . . in the home, street, factory or camp. Every page carries a title heading for quick reference.

The text is clear and easy to read and it is illustrated by 126 photographs and line drawings which emphasize important points.

Introduction to Physical Biochemistry

By J. M. Johlin, Ph.D., Associate Professor of Biochemistry, Vanderbilt University School of Medicine. Paul B. Hoeber, Inc. (Harper & Brothers), New York City. 1941. Price, \$2.75.

A preliminary survey of some of the fundamental facts which medical students must know for a better understanding of various biological phenomena and of laboratory procedures in biochemistry. The chapter on logarithms should be helpful as the average student's knowledge of this subject is inadequate.

Professional Aptitude Tests in Medicine, Law and Engineering

By I. L. Kandel, Ph.D., Professor of Education, Teachers College, Columbia University. Columbia University Press, New York. 1940. Price, \$1.60.

A review of published papers dealing with aptitude tests and their predictive value. For medicine, most of the material is garnered from the Journal of the Association of American Medical Colleges.

Approved Laboratory Technic

By John A. Kolmer, M.D., Professor of Medicine, Temple University, and Fred Boerner, V.M.D., Assistant Professor of Bacteriology, School of Medicine and Graduate School of Medicine, University of Pennsylvania. 3d Ed. D. Appleton-Century Company, New York. 1941. Price, \$8.

Completely revised with the addition of much new material which has increased the size of the book.

Textbook of Medicine

By various Authors. Edited by J. J. Conybeare, D. M. Oxon Physician to Guy's Hospital, London. 5th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, \$7.50.

Complete revision of former editions with addition of much new material.

Aids to Anatomy

(Pocket Anatomy.) By Edward P. Stibbe, F.R.C.S., Professor of Anatomy, King's College, University of London. 10th Ed. The Williams & Wilkins Company, Baltimore. 1940. Price, \$1.50.

A very handy book for every medical student to carry in his pocket. The index is unusually fine.

THE THERAPY OF THE NEUROSES AND PSYCHOSES

By SAMUEL HENRY KRAINES, M.D.
Associate in Psychiatry, University of
Illinois, College of Medicine;
Assistant State Alienist,
State of Illinois.

Octavo, 512 pages. Cloth, \$5.50, net.

This work has been written to aid the physician, who has not specialized in psychiatry, in dealing with his psychoneurotic patients. It covers the principles of treatment, the practicality of which is demonstrated by references to over two hundred cases from the author's own experience. These cases are all of the type of patient that fills the average physician's office.

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